THE INSTITUTE OF PETROLEUM REVIEW

April 1960

V. 14 #160

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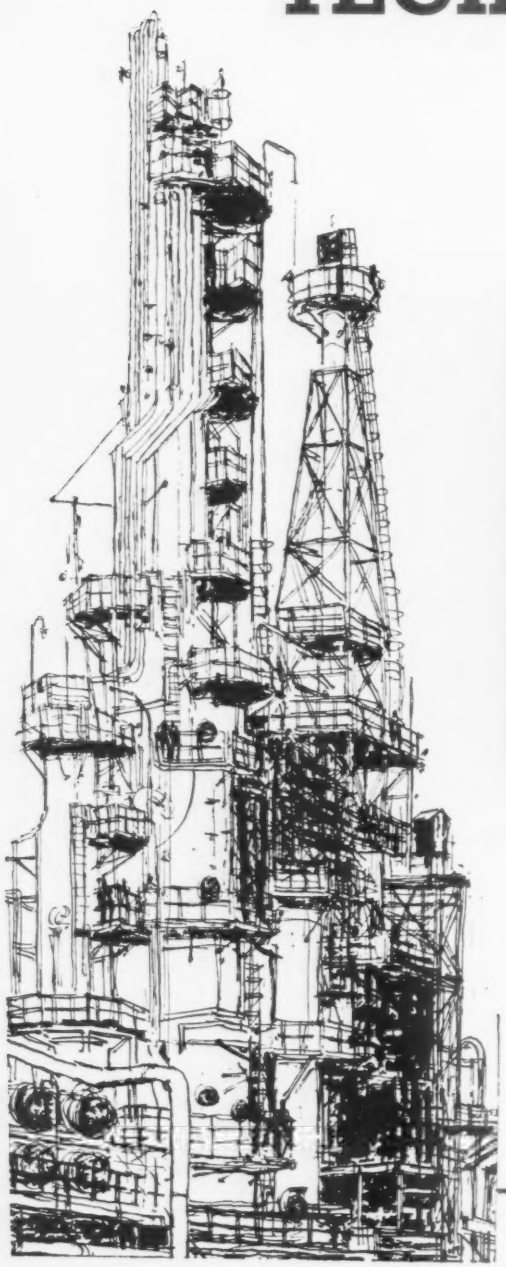

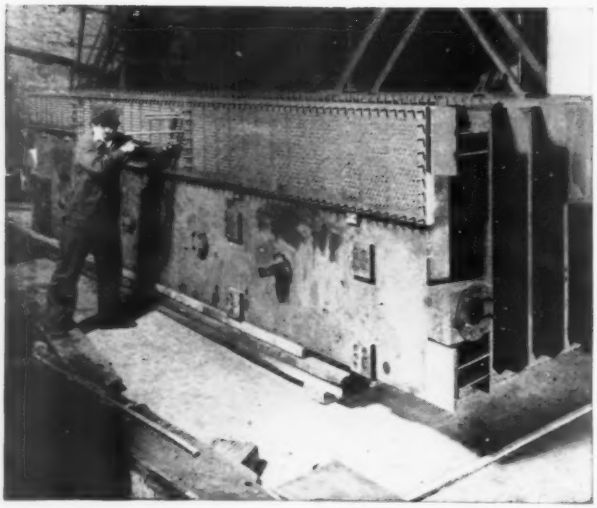

A 50,000 gal. day evaporator for a refinery under construction by Procon (Great Britain) for Anglo Ecuadorian Oilfields, Ltd., being tubed with SERCKALBRA.
(Photograph by courtesy of Richardson, Westgarth and Co., Ltd.)

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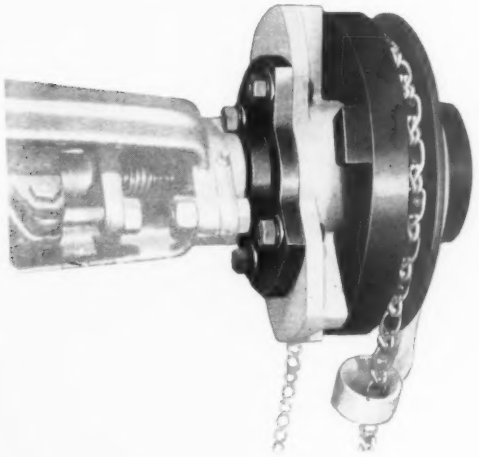

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Contents

THE ANNUAL DINNER 105

CASTROL HOUSE OPENED 110

ADDITIVES FOR LUBRICANTS *By* G. H. Thornley ... 112

AROUND THE BRANCHES... 116

PERSONAL NOTES 118

GARAGES AND MOTOR SPIRIT PRICES IN BRITAIN ... 119

NOTES OF THE MONTH 120

OIL STORAGE AT DAGENHAM 128

MOVEMENT OF CRUDE PETROLEUM IN INTERNATIONAL TRADE 1958 131

BOOKS AND FILMS 132

WORLD TANKER STATISTICS FOURTH QUARTER 1959 134

LECTURES, COURSES, AND CONFERENCES 135

TRADE LITERATURE, ETC. 137

FORTHCOMING MEETINGS 140

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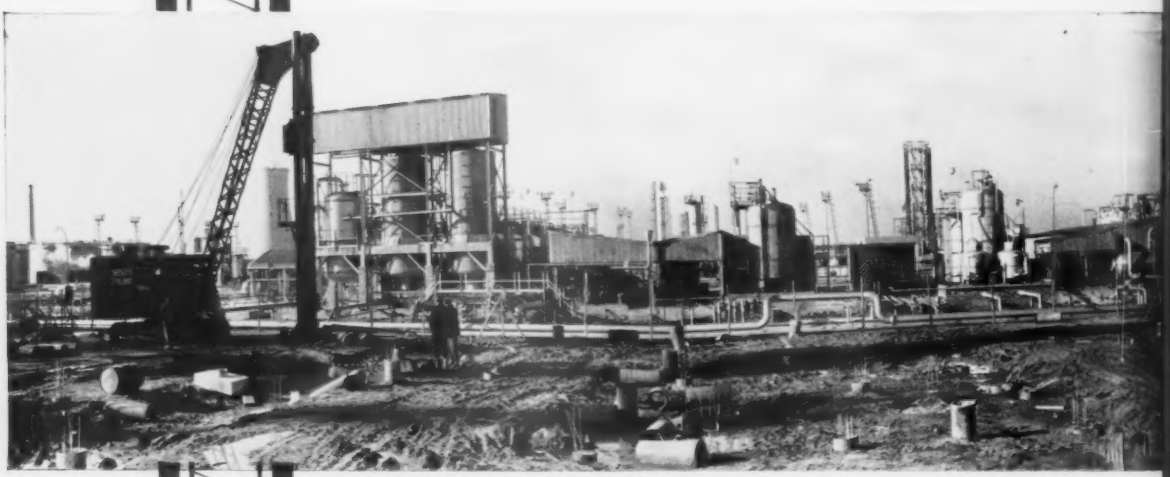
refinery foundations

This mobile piling machine is driving 14½ in. dia. West's Shell Piles to support the foundations of the Predistillation Plant at the B.P. Refinery on the Isle of Grain. Since this important site was first developed more than 11,600 West's Shell Piles have been driven to support many different items of refinery plant and equipment.

West's Shell Piling System, which combines a pre-cast sectional outer shell driven to a firm "set" in the load-bearing stratum, with a reinforced concrete core cast after driving is completed, has also been used for the foundations of petroleum and allied plant at refineries and storage installations in various parts of the country, including Fawley, Thames Haven, Belvedere, King's Lynn, Partington, Grangemouth and Avonmouth.



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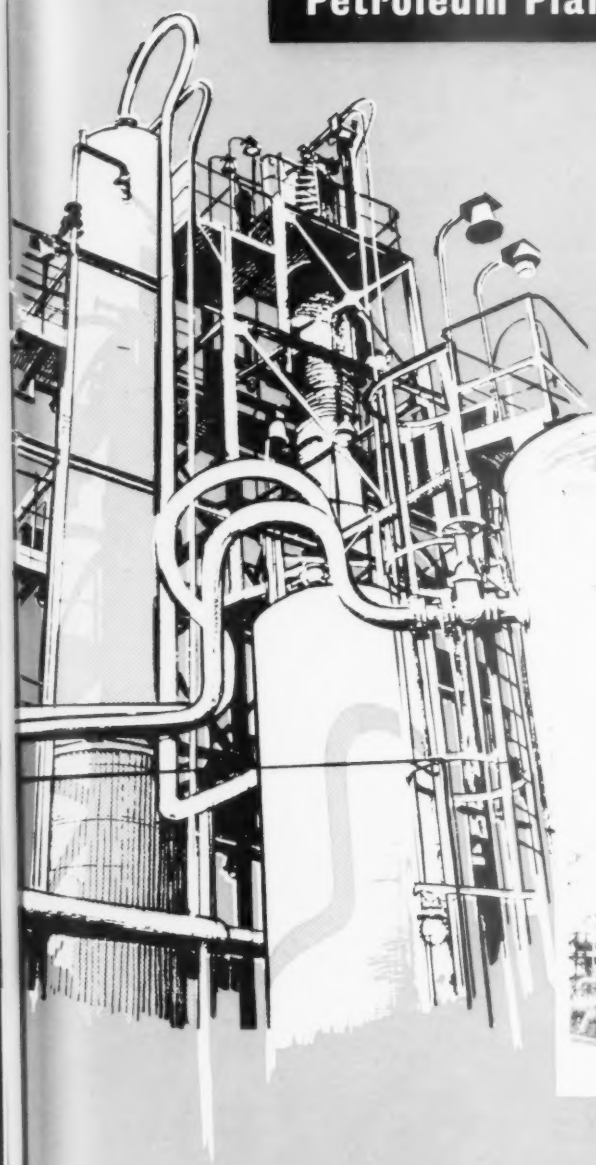

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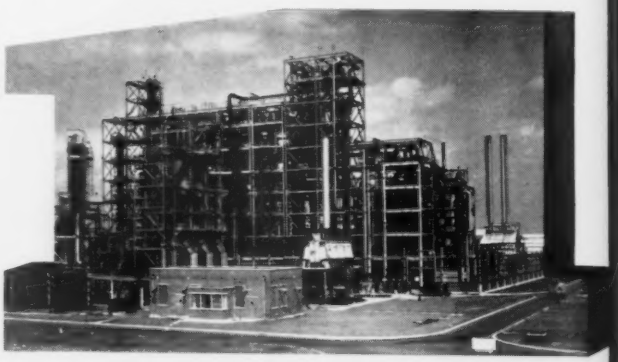
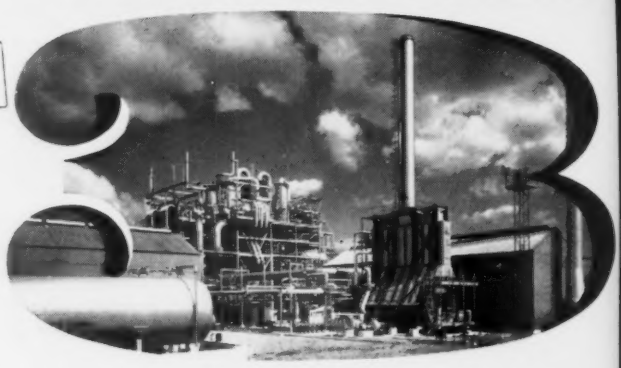


The recent completion of the third olefine plant at Wilton has made these works the largest petroleum chemical venture outside the United States. With a current output of 110,000 tons per year of high-purity ethylene, and a potential output of 140,000 tons, ICI Wilton is a magnificent example of engineering co-operation.

1956

The first plant was commissioned in 1951, and was the first full-scale adoption of the then novel process of oil pyrolosis developed in the Kellogg Laboratories. Its success led to the addition of No. 2 plant in 1956, and then to this latest extension, representing a 60% increase in olefine capacity, in 1959.

1959



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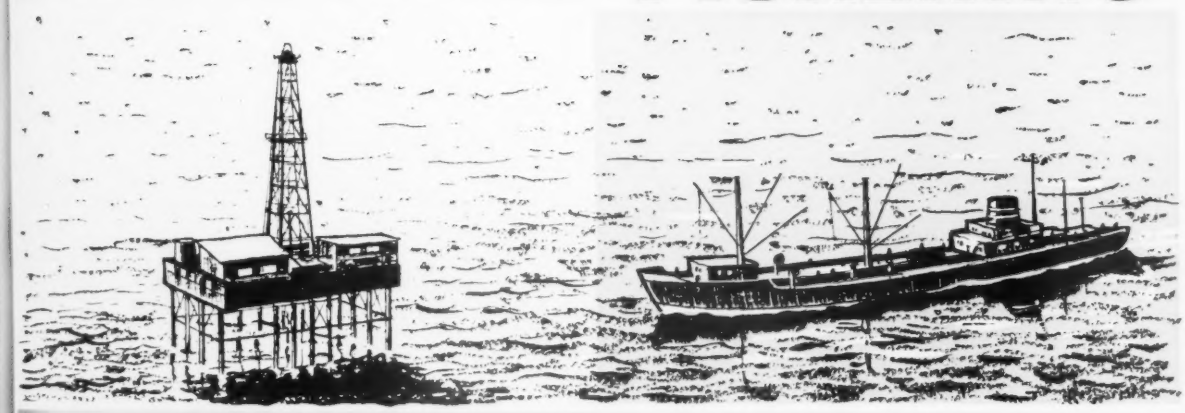

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The two smaller machines shown illustrate our 'Uniblok' and 'Twinblok' Range, and cover capacities of from 50 to 400 c.f.m. at all pressures up to 120 p.s.i.g. These are of the single stage, single acting type, styled to give a neat appearance and are unrivalled for their low maintenance and space saving features. Send for Leaflet No. T19.

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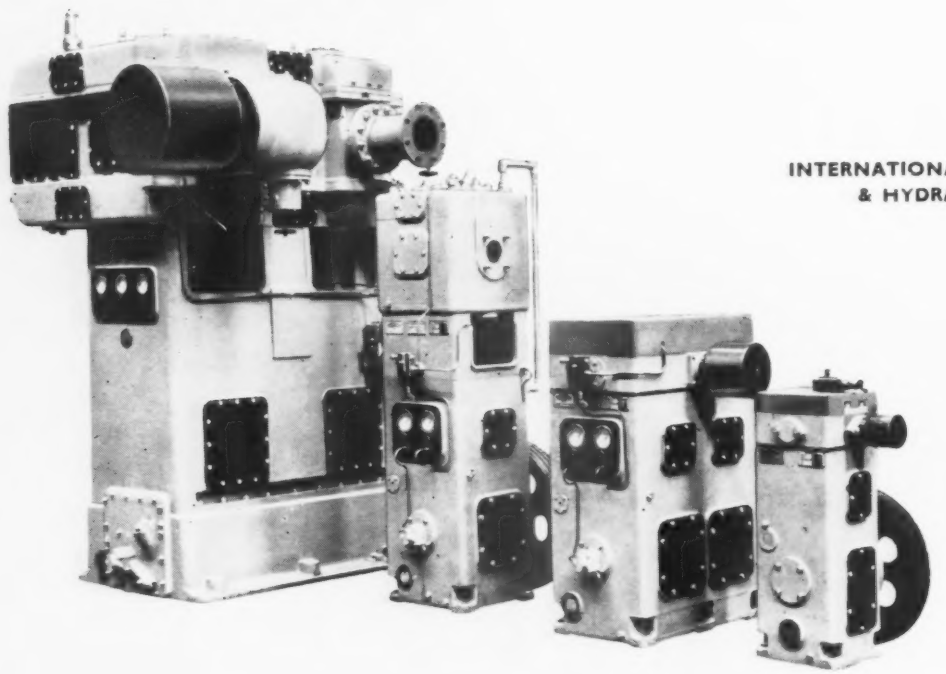

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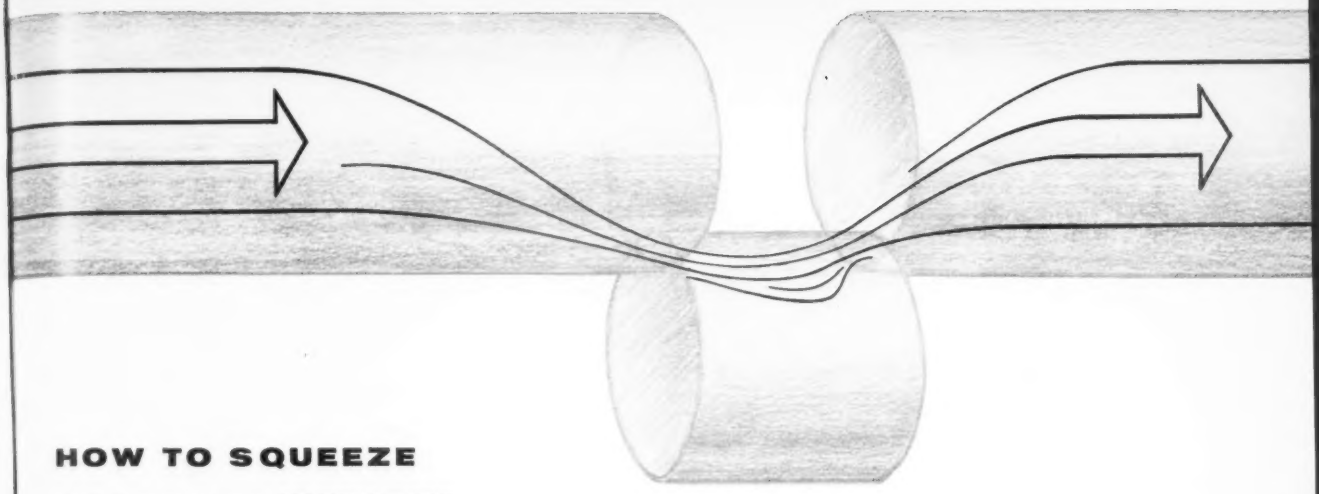
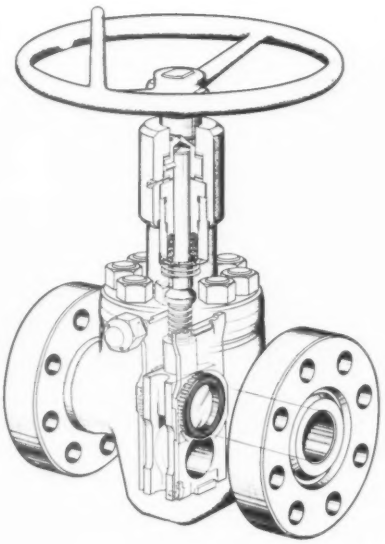
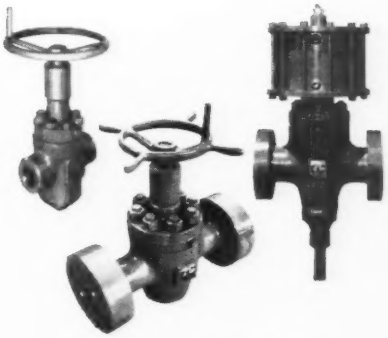


HOW TO SQUEEZE PRESSURE WITHOUT SQUEEZING PROFITS

Our illustration shows flow material in a valve as it would appear *without* the valve. This is the critical moment when the valve closes or opens. Notice how pressure and erosion are concentrated on one small part of the downstream sealing surface. In every valve except the Cameron Gate Valve this same small area is attacked each time the valve is opened or closed. Plug Valves, Ball Valves and other Gate Valves begin to lose pressure when this small portion of the sealing surface is worn away. In today's tough oil field services only thousandths of erosive wear can break the seal and squeeze profits instead of pressures.



Phantom view of Cameron Gate Valve showing double rotating seal rings.



Cameron Gate Valves are available in sizes from 2 to 6 inches, and pressures to 15,000 psi, including hydraulically and air-operated valves for remote controls and automated circuits.

Downstream sealing surface on ordinary valves, notice small area which receives most erosion.

Downstream sealing surface on Cameron Gate Valve, the wear pattern changes with each operation.

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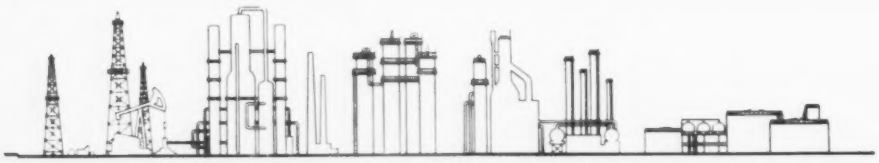

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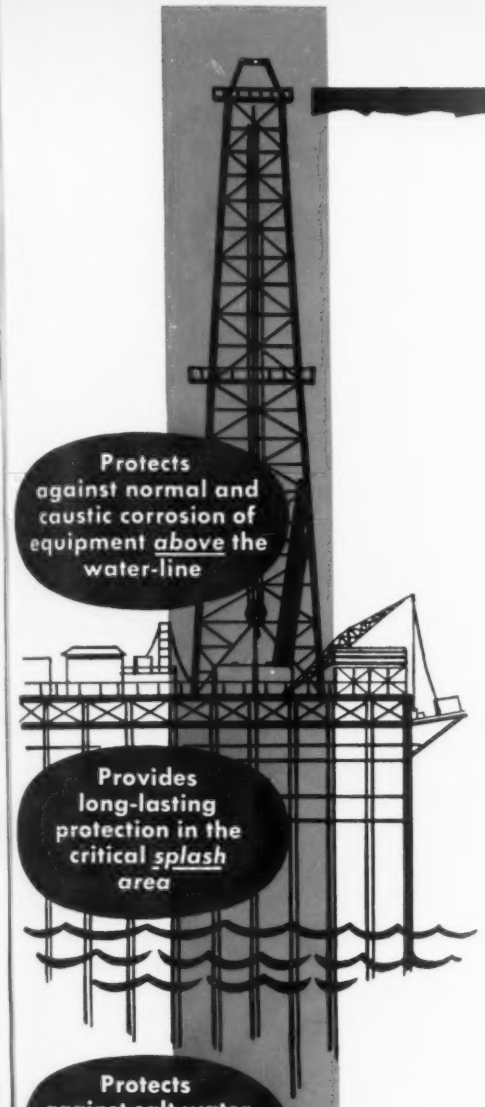
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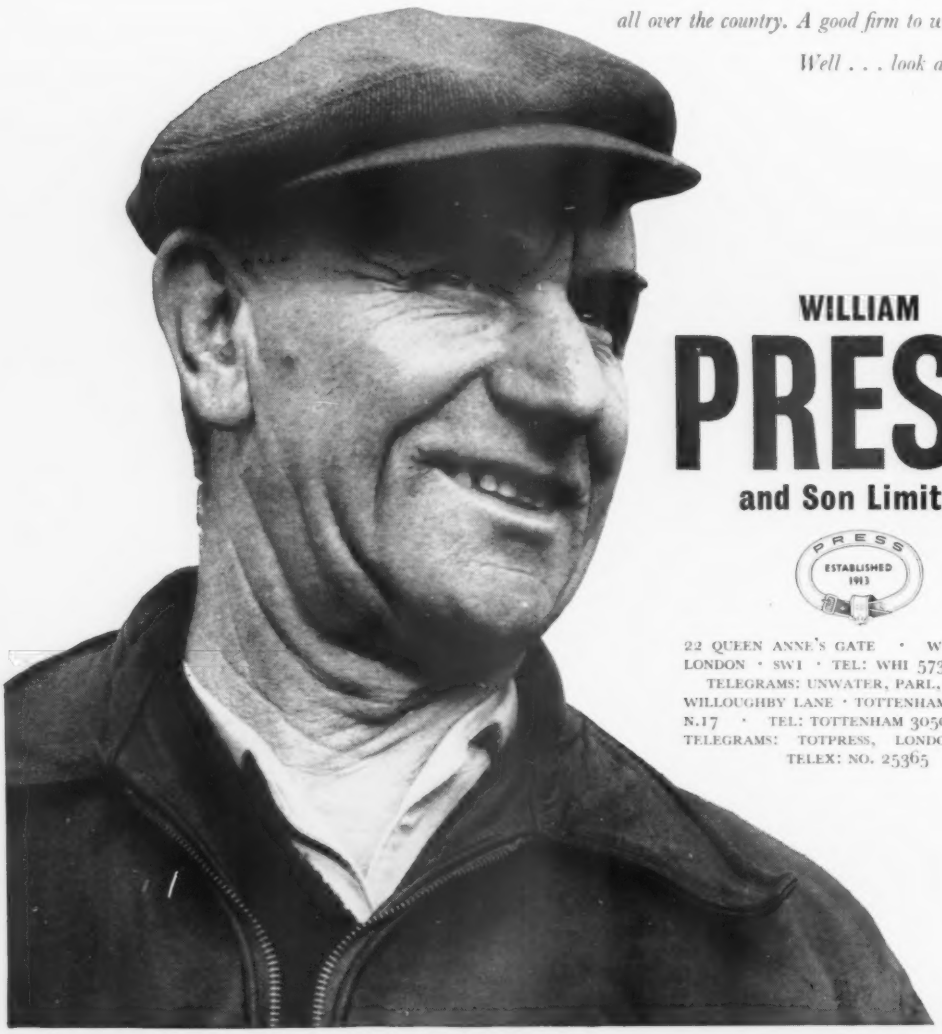

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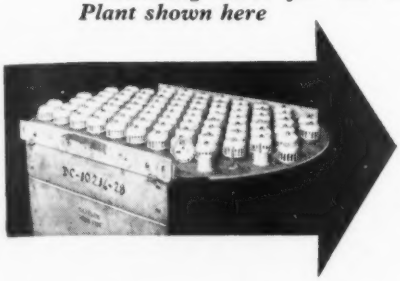

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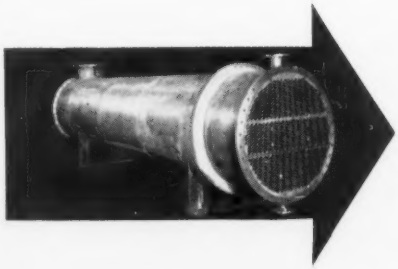

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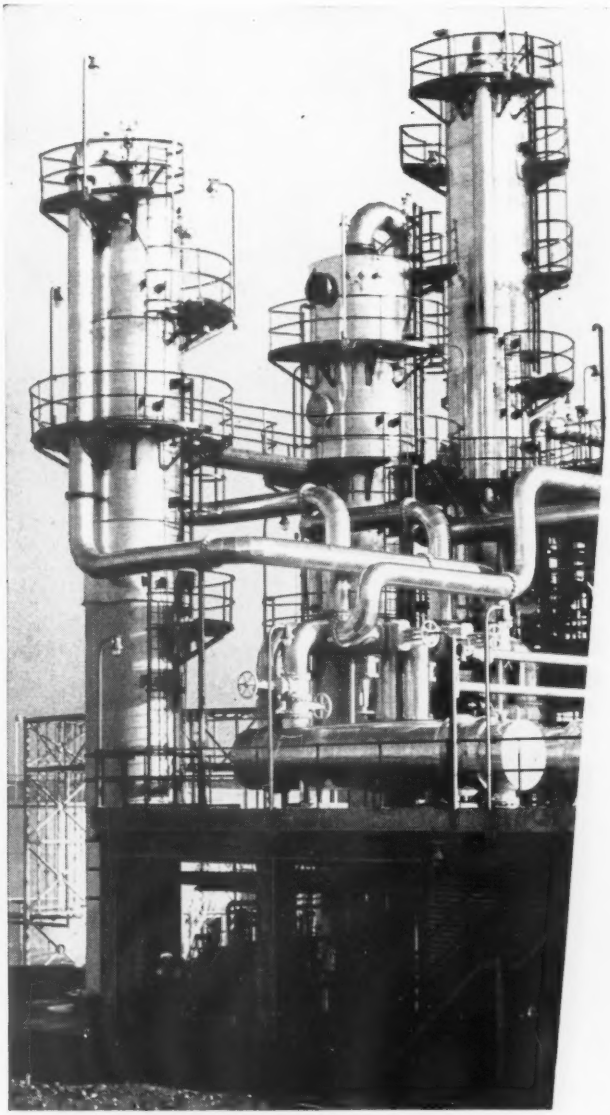

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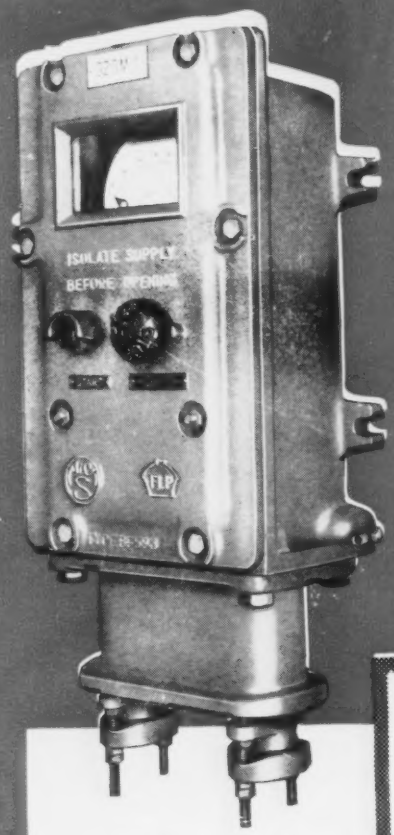
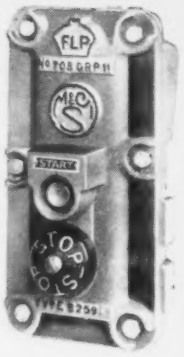


Start stop switch with ammeter which may be tropicalised

Start stop switch with coloured indicating lamp



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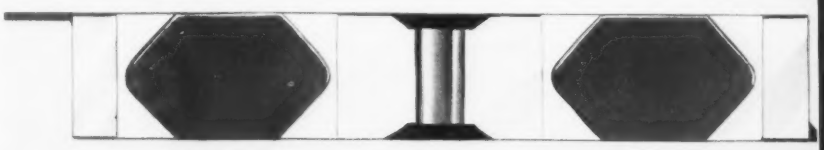

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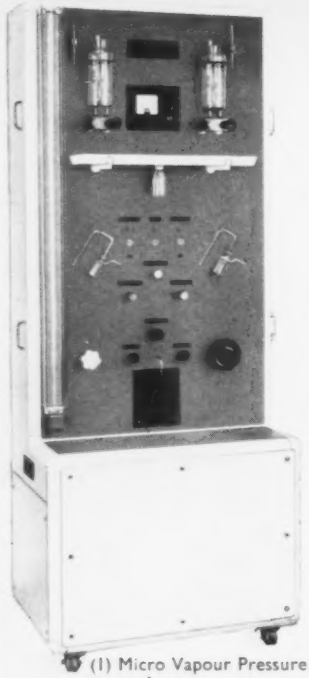

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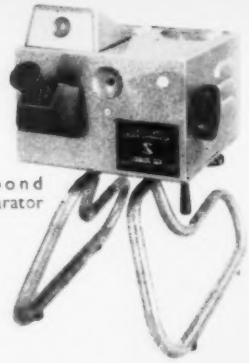

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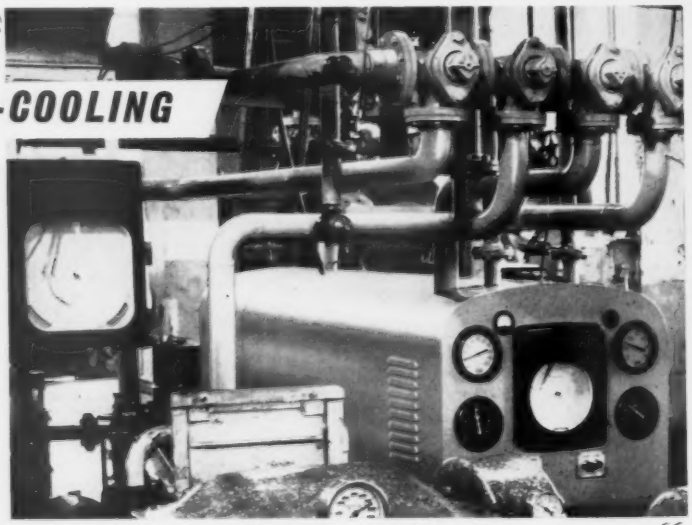

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THE INSTITUTE OF PETROLEUM
REVIEW

Volume 14, No. 160 April 1960

Honorary Editor: E. B. EVANS, M.SC., PH.D., F.R.I.C. *Hon. Associate Editor:* D. L. SAMUEL, B.SC., A.R.I.C. *Editor:* GEORGE SELL

The Annual Dinner

The Great Hall at Grosvenor House was filled to capacity on the evening of 17 February for the Annual Dinner of the Institute. The chair was taken by the President, C. M. Vignoles, C.B.E., the guests of honour being the Minister of Power, the Rt Hon. Richard Wood, M.P., and Vice-Admiral N. A. Copeman, C.B., D.S.C., the Fourth Sea Lord.

The official guests included H. D. Acres (*chairman, Regent Oil Co. Ltd*); Sir Reginald Ayres, C.B., C.B.E. (*Deputy Secretary, The Ministry of Power*); R. G. Baker (*president, Institution of Mining Engineers*); C. C. Bates (*chairman, The Pipeline Industries Guild*); C. T. Brunner (*director, Shell-Mex and B.P. Ltd*); J. H. Buscombe (*director, Shell-Mex and B.P. Ltd*); H. D. Carter (*president, Institution of Mechanical Engineers*); Dr C. M. Cawley, C.B.E. (*Chief Scientist, Ministry of Power*); Air Chief Marshal Sir Walter Dawson, K.C.B., C.B.E., D.S.O. (*Air Member for Supply and Organization*); Sir James Dunnett, K.C.B. (*Permanent Secretary, The Ministry of Transport*); W. E. Eadie (*chairman, Burmah Oil Co. Ltd*); Monsieur G. Flambard (*president, Association Français des Techniciens du Pétrole*); The Hon. William Fraser (*managing director, Kuwait Oil Co. Ltd*); The Rt Hon. Lord Godber, of Mayfield (*chairman, Shell Transport & Trading Co. Ltd*); J. C. Gridley, C.B.E. (*chairman, Mobil Oil Co. Ltd*); Air Commodore W. Helmore, C.B.E. (*director, C. C. Wakefield & Co. Ltd*); E. LeQ Herbert (*president, Royal Institute of Chemistry*); G. H. Herridge (*managing director, Iraq Petroleum Co. Ltd*); W. K. Hutchinson, C.B.E. (*president, Institution of Chemical Engineers*); Major-General L. O. Lyne, C.B., D.S.O. (*deputy-chairman, Manchester Oil Refinery (Holdings) Ltd*); E. G. C. Mardall (*general manager, Lobitos Oilfields Ltd*); E. L. McGinnis (*Petroleum Attaché, The Embassy of the United States of America, London*); Sir Frederick Hoyer Millar, G.C.M.G., C.V.O. (*Permanent Under-Secretary, The Foreign Office*); J. M. Pattinson (*managing director, British Petroleum Co. Ltd*); R. J. Pinder, C.B.E. (*managing director, Esso Petroleum Co. Ltd*); Sir Dennis Proctor, K.C.B. (*Permanent Secretary, The Ministry of Power*); General Sir Brian Robertson, Bt., G.C.B., G.B.E., K.C.M.G., K.C.V.O., D.S.O., M.C. (*chairman, The British Transport Commission*); H. W. Rocke (*managing director, Mobil Oil Co. Ltd*); H. E. Snow, C.B.E. (*deputy-chairman, British Petroleum Co. Ltd*); K. L. Stock, C.B. (*Under-Secretary, The Ministry of Power*); Dr G. J. Stubblefield (*president, The Geological Society*); H. C. Tett (*chairman, Esso Petroleum Co. Ltd*); G. H. Thorne (*chairman, Council of British Manufacturers of Petroleum Equipment*); W. C. Townsend (*managing director, Caltex Trading and Transport Co. Ltd*); H. Wilkinson, C.M.G. (*managing director, Shell International Petroleum Co. Ltd*).

Supporting the President were the following: (*immediate past-president*) The Rt Hon. Lord Geddes, C.B.E., D.L.; (*past-presidents*) E. A. Evans, Prof. F. H. Garner, O.B.E.; (*vice-presidents*) C. Chilvers, H. Hyams, T. W. Mathias, O.B.E.; (*members of Council*) V. Biske, J. H. M. Clark, G. A. Dickins, E. J. Dunstan, A. J. Foster, F. L. Garton, Sir Stephen Gibson, C.B.E., L. L. Hosking, M. E. Hubbard, Dr K. E. W. Ridler, D. L. Samuel, D. H. Tullis; (*hon. treasurer*) O. F. Thompson, O.B.E.; (*hon. secretary*) W. M. Catchpole; (*hon. editor*) Dr E. B. Evans.

The President and the Minister of Power, the Rt Hon Richard Wood, M.P.

The Institute and the Industry

The Right Honourable **Richard Wood**, M.P., The Minister of Power, proposing "The Institute of Petroleum and The Petroleum Industry", said:

Your industry goes back for a very long time, and the Institute goes back for nearly as long, and I have been doing a joint calculation with the President about the length of experience of the oil industry in whose presence I am speaking this evening. He tells me these are his figures, and they are not mine, that the number here is 1500, and he has guessed that the average experience of the industry of those 1500 is

Lord Godber of Mayfield, being greeted by the President

about twenty years, therefore I am speaking in the presence—it is a most dominating thought—of 30,000 years of experience of the oil industry.

Now, my sojourn—and I think in the light of recent events I use the right word—at the Ministry of Power is just about four months, rather less than four months, during which my instruction in the oil industry has had to compete with instruction in coal, electricity, gas, and steel.

This is my first opportunity to speak to this great industry, and I realize that it must neither be abused nor missed. My critics, in the three or four months I have been at the Ministry of Power, have complained that I have no policy for fuel, and I have several times replied that in fact I have a very good one: to give to consumers the fuel that they want, as cheaply and efficiently as possible.

I am glad to find that that policy has been endorsed by the Energy Advisory Commission of the OEEC, of which the chairman is Professor Robinson. I need not quote to you, because you all have them at your finger-tips, the conclusions 5, 6, and 17. But that policy seems to me, and I hope to you, to be sensible, although some people suggest to me that it is reprehensible. I read a great deal nowadays, in the *Daily Mirror* and other newspapers which somehow find their way into my office, about things which I think are called "vital statistics", and I understand that these things which are called vital statistics are something which no film star or government can afford to ignore.

Mr President, your industry's statistics are thought by some people to be too vital for comfort. And the Ministry of Power is frequently urged to do something to check your development. Somehow I do not think it is the duty, either of the Ministry of Power, or of any other Minister, to provide the necessary equipment to restrain the exuberant expansion of an industry which, although a hundred years old, displays all the vigour of youth.

So far as possible, the Government wants to pursue liberal policies of expansion, rather than protected policies based on restriction. Last October, as you will no doubt have noticed,

H. W. Rocke and the President share a joke

Sir Brian Robertson (right) *with the President*

the Government removed the last traces of control over dollar oil imports, and our efforts are continuing towards freer trade in Europe. We in the U.K. have a very great stake in liberal policies, not least in the case of oil, and there are many people today in all parts of the world who are prepared to place limits on the free movement of oil and other commodities. I am concerned that our policies at home should not give them encouragement. But, on the other hand, there cannot be a free-for-all, or in some peoples' phrase, there cannot be in the U.K. a prevailing law of the jungle because the fuel policy of any nation seems to me to be determined by a number of considerations—economic, political, strategic, aesthetic, and human—and I am quite certain that no Minister of Power can possibly ignore the human considerations which are at present involved in the coal industry, for instance, as it adjusts itself to its new place in the national economy.

Mr President, I am immensely proud of my present connexion with the oil industry, and I would like to wish it every success in the future in the work that it is doing not only for Britain and the free world, but also for the consumer (who very often gets forgotten). Gentlemen, I ask you to drink

the health of the Institute, coupled with the name of its President, Mr Vignoles.

The President Replies

Replying to the toast, **C. M. Vignoles,** C.B.E., said:

We are particularly grateful to the Minister for being with us tonight, and for his generous remarks about the industry. We are delighted to welcome him, and to pay tribute to his distinguished career, both in war and peace, and to wish him every success in the heavy responsibilities of his high office.

About 200 years ago, the Society for the Encouragement of Arts, Manufacture, and Commerce, later to be called The Royal Society of Arts, was founded, and one of its members referred to it as "Now the greatest assembly of men that in any country ever sat in a disinterested manner to the good of its people". Whether this might be a fair description of this great assembled company, over 1400-strong, tonight is probably doubtful, but at least I can report on the health of the Institute as a whole and its continued growth.

It is our belief that it is fulfilling a worthwhile purpose, within the objectives that it has laid down for itself, and the Institute of Petroleum is both here and on an international scale doing, I hope you will feel, a good job.

It is providing the Secretariat of the Permanent Council of the World Petroleum Congress, which the Institute itself instituted and conceived in London as far back as 1933, when they had the first Congress here. And at the recent Fifth World Petroleum Congress in New York, which many of you attended, Sir Stephen Gibson, who we are glad is with us tonight, was elected chairman of the next Congress to be held in 1964 in West Germany.

Nine branches of the IP are now flourishing in the British Isles, and particularly keen and active branches are also thriving in Kuwait, Bahrain, and Trinidad, and we hope it will not be long before one is incorporated in Iran. I have had the good fortune recently to visit Kuwait and Bahrain, where I was received with the greatest kindness and hospitality, and expressions of good will to the Institute here in London. No visitor there could fail to be impressed with the skill and patience with which their members are meeting all the peculiar difficulties of these areas, nor fail to be struck with the really fantastic progress which has been made in the last few years. And when that visitor sees such developments as the magnificent new jetty at Kuwait, capable of loading 10,000 tons an hour, and the spectacular engineering feat at Kharg Island, where twenty-four miles of pipeline have literally been hauled along the bed of the ocean to provide a new terminal to find a new outlet for the rich South Iran oilfields, his imagination is certainly kindled by the thought of what all this means in the way of potential progress, not only to the West, but to the local dwellers there. One is indeed proud that British enterprise has played its part in all this. Unfortunately I have not, during my term of office, organized myself sufficiently well to get to Trinidad, but I shall have to leave that to my successor to take your greetings personally to that thriving branch.

Lord Geddes and Dr C. M. Cawley discuss a problem

None of our many activities would be possible without the devotion and the hard work of our permanent staff, headed by our secretary, D. A. Hough, and our editor, George Sell, and to all of these we owe much.

Only on Monday we heard the striking news that British exports had reached a new high level, and in 1959 they were 5 per cent higher than in the previous year, and even with greater imports our trading balance is substantial, to the tune of £200 million. Industrial production is running about 10 per cent up, and steel output has recovered to an all-time record, so that once more, on the threshold of this new decade, the omens for progress are good.

Though we in these islands represent only 2 per cent of the world's population, we do 10 per cent of the world's trade. If our industrial base is strong, then our currency commands confidence, and not only can we secure our own survival, but that of the developing Commonwealth now evolving along such strikingly original lines of multi-racial and commercial relations.

In this broad and hopeful picture of our immediate future, what part is foreseen, first for the fuel industries, and secondly for the petroleum industry as one of these? Britain is now burning fuel at the rate of nearly 30,000 tons every hour of every day, and the demand is steadily rising. Historically, the country's prosperity has been based on coal, and last month, Mr Minister, you told the country that the coal industry would be supplying 70 to 75 per cent of the country's fuel needs in the foreseeable future. I am sure that the nation

E. A. Evans and Air Commodore W. Helmore reminisce

(Courtesy of *Daily Mirror*)

The photograph mentioned by Vice-Admiral Copeman in his speech. The "Victorious" was towing the oil steamer by a hawser, along which was a flexible metallic hose through which oil was pumped

as a whole, including the oil industry, does mark and accept that fact. But likewise we all should note that 25 to 30 per cent of the nation's energy requirements will have to be met by alternative sources of power. No one except the user can say which fuel is the most economical for his own purpose, and we thank you, sir, for putting so clearly your views on this point. But we do also understand, only too well, the social implications involved, and I am sure you will find the industry sympathetic on that point.

Touching our part in all this, it was Keats who wrote in the last century: "And other spirits there are standing apart, Upon the forehead of the age to come; These, these will give the world another heart, and other pulses". It would be presumptuous to assume that Keats was predicting the exploits, 40 years later, of James Young, north of the Border at Bathgate; still less those of Edwin Drake across the Atlantic in Pennsylvania. But in our age petroleum products have certainly given the world "another heart and other pulses". Not only have they been the "raison d'être" of much of our scientific and industrial development, the internal combustion engine itself, for example, and more recently the growth of the chemical industry, but they now offer an economical alternative to fill such gaps in our fuel oil requirements as may arise.

So what are our tasks in the oil industry, to help to keep the heart of the British economy sound? And to make its pulse beat firmly? I suggest they are first, as the Minister says, to supply our petroleum products at the lowest possible cost, and to offer the customer the best possible service; and secondly to ensure, insofar as anything can be ensured, in this uncertain world, that supplies will be plentifully available. Happily, we can report that proven oil reserves, not to mention gas, are much greater than ever before. In the non-Communist world they are equal to 40 years' production at present rates of consumption. More than £2500 million was spent last year on exploration and the development of the free world's resources. An increasing proportion is being devoted to the search for a wider basis for our source of supply. Two important new sources, the Sahara and to a lesser degree, Nigeria, started supplying petroleum in sizeable quantities last year. New oilfields have been opened up in Venezuela, and the Canadian contribution has steadily increased. Exploration continues energetically in other parts of the world, and in the last twelve years, annual capital and exploration expenditure in the industry has almost trebled, and this has very largely been financed by re-investment of the industry's own earnings. As to shipping, there is at present adequate tanker tonnage, far more than there was at the time of the closing of the Suez Canal, when nevertheless the industry managed to keep Western Europe supplied sufficiently, without undue inconvenience to the consumer. We have never been so well placed to supply an adequate quantity and quality of all the petroleum fuels that British industry and commerce require of it. And in serving the British economy, we are aware that we are helping to keep the nation sound and strong so that she may continue to play her civilizing role in the years of tumultuous change through which we are living.

The Guests

And now, said Mr Vignoles, it is my very pleasant task to propose the health of our guests. We are so generously represented by what our leading daily journal calls the "top people", that I hesitate—in fact, it would be impossible—to name them all individually. Apart from our pleasure in having Mr Minister with us, we have representatives of his Ministry, and other Government departments; we have with us the Petroleum Attaché of the U.S. Embassy, and a visitor from overseas, from our associated institute in France, Monsieur Flambard, President of the Association Française des Techniciens du Pétrole. We have representatives from other bodies, and of course, we also have, we are delighted to say, a very large number of the heads of the big U.K. petroleum companies, on whom the Institute depends. Finally, we have a guest who was kind enough to say he would reply on their behalf, Vice-Admiral Copeman, Fourth Sea Lord, who is peculiarly the one to reply on behalf of the guests when we think of the long association of the Royal Navy with the oil industry. Our sincere congratulations to him on his recent promotion to Vice-Admiral.

Members of the Institute of Petroleum, will you be upstanding and drink the health of your guests.

Vice-Admiral **N. A. Copeman,** C.B., D.S.C., replying for the Guests, said:

It is difficult to appreciate how the whole use of oil in the Royal Navy has been carried out in my lifetime as a consequence of the Royal Commission on Fuel and Engines presided over by the famous Jackie Fisher. And at a very early date some surprising strides were made—for instance I have a photograph in my office, taken in 1906, of HMS *Victorious* receiving fuel over her stern while under way at sea. It took a long time before that development became a matter of course, but last year half of all oil fuel received by the operational Fleet was passed that way.

Other developments were more rapid and the Royal Navy has been able to take advantage of them owing to the very close and cordial relations between the Navy and the industry which have existed since that Royal Commission.

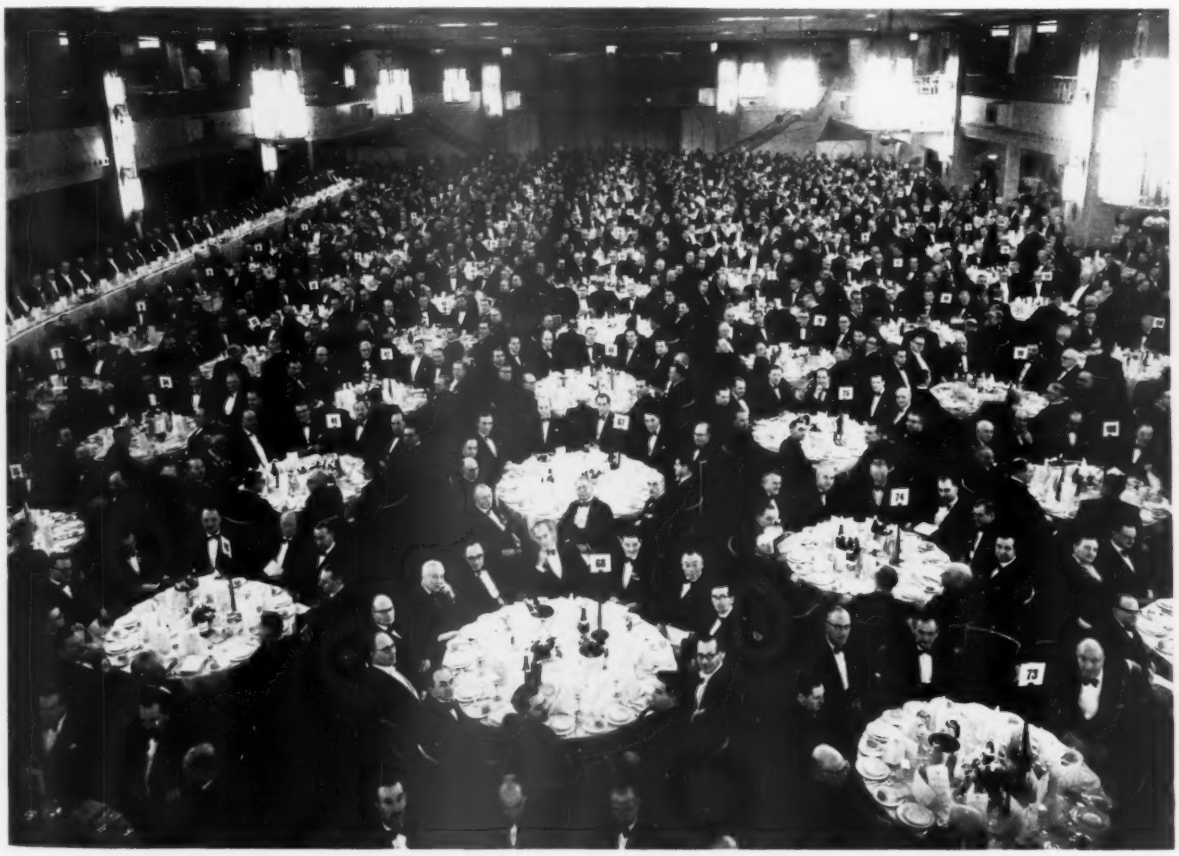
To assist the Navy in maintaining their very close links with the oil industry we now have a body known as the Admiralty Fuels and Lubricants Advisory Committee, consisting of expert advisers from the oil industry and other

allied professions, the universities, and Government departments. This Committee, some of whose members are past-presidents of your Institute, has served the Admiralty well and it provides an association with your industry and your Institute which we in the Navy value highly. This was successfully demonstrated last May when a meeting took place in London on fuels and lubricants between the United States Navy, the Royal Canadian Navy, and the Royal Navy. We were supported by members of the Admiralty Fuels and Lubricants Advisory Committee and our visitors brought with them members of the oil industry of their countries. This exchange of ideas and discussion of mutual problems was of great value to us all and I am most grateful to the Institute of Petroleum for all you did to make the Conference a success including a most excellent cocktail party. I would also like to say a word of thanks to the tanker companies who helped very much with our many problems.

Before the last war the main source of the Navy's oil and fuel was from the Persian oilfields. The present-day fuels we use do not greatly differ in performance although our specification has changed periodically in various small ways. However, several generations of machinery have been well served by this type of fuel. We now seem to be approaching a period of some change. In order to save weight and space in HM ships so as to increase their effectiveness as weapon carriers we are developing boilers whose power/weight ratio has progressively increased until we are now approaching the stage where the present type of fuel causes deposits to form on the boiler tubes of a type which we find very difficult to remove, thus greatly increasing our maintenance task. In the end we may have to use a distillate fuel for boilers; we appreciate the supply of this type of fuel may be a bit awkward because of the present heavy demands on the middle distillate but I expect the industry will, if necessary, succeed as always in meeting our requests. This problem may not, however, arise as I believe you are doing your best to find some way of improving the quality of the present black oil in order to avoid these deposit troubles.

I would also just like to mention that changes in our requirements are also taking place regarding lubricating oils and hydraulic fluids. The present tempo of more and more complex machines and weapon control mechanism means that improvements in these fields are needed; we will often be unable to use the conventional products.

Now, I want to say what I should have said at the beginning, which is to thank you. This has been a splendid evening, with congenial company, and we have had a very good dinner. I am sure the guests would like me to say how very much we have enjoyed ourselves, and thank you, Mr President, and the Institute, most warmly, for inviting us.



Castrol House Opened

Minister of Transport on Traffic Problems

Castrol House, the new headquarters of the Wakefield Castrol Group in Marylebone Road, London, was formally opened on 22 February by the Rt Hon. Ernest Marples, M.P., the Minister of Transport.

The Minister was introduced by Leslie W. Farrow, C.B.E., chairman of Messrs C. C. Wakefield & Company Ltd, parent company of the Group. He said that the Company was founded 61 years ago by Charles Cheers Wakefield, who later became Viscount Wakefield of Hythe, a great man and a true pioneer of motoring and of aviation. Lord Wakefield would have been proud of the new building and of the way in which his firm "had grown to become the largest organization in the world devoted solely to the production and marketing of lubricating oils and allied products. And Wakefield's is still, as it was in the founder's time, an all-British company."

After paying tribute to the men whose vision and skill had gone into building Castrol House, The Hammerson Group of Companies (the developers), Messrs Collins, Melvin, Ward, and Partners (the architects), Sir Robert McAlpine and Sons (the main contractors), and specialists in many fields, Mr Farrow invited Mr Marples to perform the opening ceremony.

Prior to unveiling the plaque commemorating the occasion, the Rt Hon. Ernest Marples, said:—

People must be wondering why I, the Minister of Transport, am opening this building. It is because you deal with motor cars, and motor cars are here to stay. We have no option in this country but to come to terms with them. At present there are 8½ million vehicles, in 1975 we must budget for 15 million vehicles—a lot of cars and in this crowded island the combining of an orderly flow of cars with the retention of their amenities and the preservation of the character of our cities will be quite a formidable task.

There is no simple solution or any magical formulae. It will not be solved by new road engineering alone nor just by the ingenious application of traffic engineering techniques. It is a question of planning.

It involves architects, town planners, landscape specialists, engineers—in fact, every ingredient which goes into the creating of a community.

We in the Ministry are setting up a long-term study group to probe into the future of our cities. We must find a design for living in the last quarter of this century.

Castrol House makes an imposing addition to the buildings in the Marylebone Road

Now this magnificent Castrol building gives me a chance to mention just two of the many points this study group must consider.

First, future buildings must provide for off-street parks for their own motors. Traffic will never flow if cars are dumped in a main street and left there all day. I do congratulate you on providing in this building more space for parking of cars than is actually required by the staff.

The second point that will be considered by the group is a comprehensive plan of reconstruction of our cities which must include some multi-level traffic circulation and the segregation of pedestrians from the roads. I am simply appalled at the figures of people killed and slaughtered on the road each year.

The Minister of Transport unveiling the plaque which commemorates the opening

when floodlit at night through opaque green glass panels, is a new sight of London.

In addition to accommodation for the 800 headquarters staff of the Castrol Group, the new building contains several conference rooms, two restaurants, a cinema, a showroom, an underground garage, and a residential suite on the fourteenth floor for the use of visiting executives from overseas.

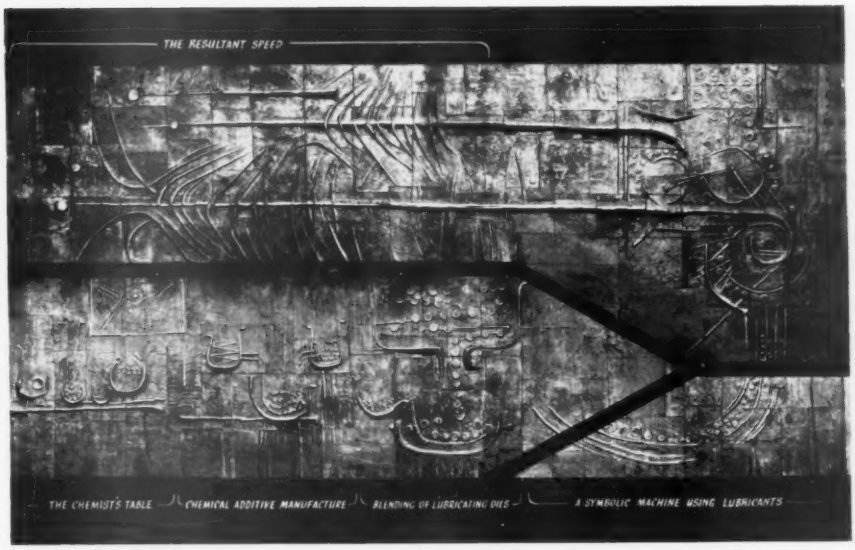
Dominating the entrance hall is a 50 by 24-foot mural designed and cast in aluminium and using primitive symbols to develop "the story of lubricating oil". It was designed by Geoffrey Clarke, A.R.C.A.

Zonal heating is automatically controlled and governed by external climatic conditions. Likewise, the fluorescent lighting is automatically controlled by the density of daylight.

Perhaps in our busy shopping centres the pavements could be lifted to the first floor level and the ground-level pavements used to widen the existing road. It may well be that the cities of the future will be built this way and I would like to carry out an experiment with an existing street to see if this can be done.

The Building

Covering an area of nearly one acre, the main architectural feature of Castrol House is a twelve-storey glass tower which,



The mural by Geoffrey Clarke which depicts the story of lubricating oil

ESSO EDUCATION FOUNDATION GRANTS

Esso Education Foundation announced in December of last year the award of 363 grants totalling $1,466,500 to 330 institutions for the academic year 1959–60.

These grants, 291 of which are unrestricted, bring to nearly $7,500,000 the total amount granted by the Esso Education Foundation in its five-year existence to privately-supported colleges and universities in the United States.

In addition to the unrestricted grants which total $774,000 in 1959, the Foundation will also continue to make special capital grants and grants for scientific research, and a limited number of research projects, most of which are in the humanities. Such grants amount to $517,440.

In its five years of operation the Foundation has assisted over 400 privately-supported undergraduate institutions in all of the 43 states which have private colleges, and in the District of Columbia. These have included men's, women's, and co-educational colleges, universities, and technical schools.

Additives for Lubricants[*]

By **G. H. THORNLEY**

Extreme Pressure Additives

Extreme pressure additives are used to increase the load-carrying capacities of oils. The expression EP (extreme pressure) which has become very common, is best reserved for those chemically-active load-carrying additives which are serviceable in hypoid gear oils. A variety of other load-carrying additives, of less activity, but great value in certain applications, are better described as load-carrying additives, the reason being that when people in the industry think of EP additives, they think of the chemically-active hypoid type. In the hypoid gear, a combination of high rubbing speed and high unit loading provides very difficult lubrication conditions, especially during the running-in period. The lubrication requirements are different in low speed-high torque conditions from those in high speed-low torque conditions, and in the past different types of additives have been needed to satisfy either completely. With difficulty a compromise was reached which adequately served both cases, although in certain passenger cars, high speed shock loading conditions required a degree of chemical activity in the axle oil which made it impossible, with the same oil, to satisfy the requirements for low speed-high torque conditions in other vehicles. This goes back to the time when the low speed-high torque kind of oil was required for trucks, and the high speed-low torque shock loading type for passenger cars. A compromise was reached whereby what was called the universal hypoid gear lubricant could be used in both type of vehicles, until the passenger car conditions were intensified to the state where, in certain models, it was necessary to use a higher degree of chemical activity which prevented the oil passing the low speed-high torque test. Compounds of sulphur, chlorine, and phosphorus were generally used, and the mechanism appears to be that the compounds in oil solution are stable at normal bulk oil working temperature, but when minute asperities on the mating surfaces are breaking through the oil film, a rapid temperature rise occurs, and welding of the high spots will take place if no additive is present. Suitable sulphur compounds decompose at the minute points of contact before welding temperature is reached, thus a sulphide film of lower melting point than the metal is formed, and welding is prevented. Chlorine compounds act similarly by the formation of chloride films. Therefore the effectiveness of an additive under any given condition probably depends on the temperature at which it will react with the metal of the gear, and the nature of the film so produced. Iron sulphide films provide the best resistance to welding, and are stable at high temperatures, over 800° C, but they have a high co-efficient of friction. Iron chloride films have a lower co-efficient of friction, but break down at about 300° C. Phosphide films, which are believed to form a low melting eutectic with the free metal, are probably formed by compounds containing trivalent phosphorus at moderate temperatures, and provide protection against metal deformation under conditions of low speed and high torque.

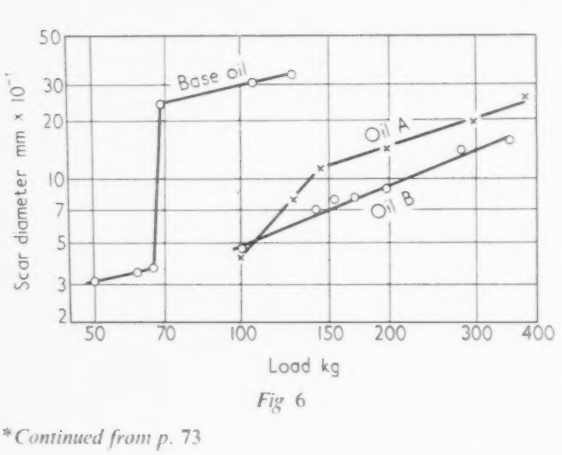


Fig 6

TABLE VIII

	Ring weight loss, mg		*Approx surface roughness after test, micro inches*	
Oil	Top	Bottom	Top	Bottom
Base	Total failure		Total failure	
B	180	409	63	63
A	15	15	16	8

Tests at 200 lb load. 107° C for 12 hours.
Initial surface roughness, approx 32 micro inches.

Axle Tests

The operating conditions in rear axles, especially in the United States, are becoming much more severe, and the United States military specification MIL-L-2105, which has been in existence for quite a number of years, will probably be superseded very shortly by a new specification requiring higher performance in intensified full-scale axle tests.

These axle tests are, of course, very expensive to run. They use a new crown wheel and pinion for each test, and one looks again for simpler methods, as usual with great difficulty. There are a number of extreme pressure lubricant testing machines—Almen, Falex, Timken, SAE, and Four-ball—but unfortunately they do not correlate very well with one another, nor with the results from axle rig tests or field service. The SAE and Four-ball machines are useful preliminary screening instruments in relation to high speed conditions, and the SAE machine modified to operate at very low speed and very high torque shows some promise for predicting results to be expected in low speed-high torque axle tests.

Fig 6 shows curves from the Four-ball machine plotting wear scar diameter against load. Oil "A" is one which is effective in low speed-high torque, and high speed shock loading conditions. Oil "B" is required for those cases where high speed shock loading conditions are much more severe, which oil "A" cannot meet, but it has been made

[*]*Continued from p.* 73

TABLE IX

WEAR REDUCING CHARACTERISTICS OF ADDITIVES
BASE OIL: MID-CONTINENT 500 SOLVENT REFINED
FOUR BALL MACHINE TEST RESULTS

Additive	*Incipient seizure load, kg*	*Mean wear in mm at load*		
		70 *kg*	100 *kg*	150 *kg*
None	70	2·8	—	—
0·5 per cent metal-dithiophosphate type anti-oxidant	100	0·4	2·2	2·5
1·0 per cent metal-dithiophosphate type anti-oxidant	110	0·4	0·4	2·5
0·5 per cent another type of anti-oxidant	80	0·4	2·3	2·9
3·8 per cent composite MIL-0-2104 additive containing metal-dithio-phosphate	140	0·4	0·45	2·5
5·0 per cent composite MIL-0-2104 additive not containing metal-dithiophosphate	80	0·4	2·3	—

too active chemically to cope with low speed-high torque conditions.

Table VIII shows results from the modified SAE machine. The machine uses two rings, operating at different speeds, in contact under high load, and the condition of the surfaces and the ring weight loss after test can be examined.

Another aspect of load-carrying additives in the automotive field is that of valve train wear. It is a very fortunate thing that one of the most useful and popular anti-oxidant additives for crankcase oils—zinc-dialkyl-dithio-phosphate also has quite a useful bit of enhanced load-carrying capacity to contribute to the oil, and that has shown itself to be very valuable in current conditions where higher lift cams and stronger valve springs have led the car manufacturers into a fair amount of trouble with excessive cam and tappet wear. Table IX shows Four-ball machine results with the straight oil and with a zinc-dialkyl-dithio-phosphate. The increase in quantity from 0·5 to 1 per cent shows little advantage except in the wear scar diameter at 100kg load. Another type of anti-oxidant contributes little to load-carrying capacity but a composite dithio-phosphate plus detergent gives a very good result, while a similar composite additive, without the dithio-phosphate, using another anti-oxidant, is not so good.

The dithio phosphates themselves vary somewhat in their load-carrying improvement characteristics, especially according to the type of basic alcohol used. It has been found in bench engine tests, using an engine which had suffered very severely from valve train wear, that with five different types of dithio-phosphate additive, using the amount required in each case to give 0·06 per cent of phosphorus in the oil, and using the same base oil throughout, that the total wear on the eight tappets from each engine test varied from 0·007 inch to 0·009, 0·013, 0·022, and 0·042 inch with different dithio-phosphates. These tests were reasonably repeatable.

Two-Stroke Engines

Two-stroke engines are now very popular; their numbers are increasing every day. They have a great variety of designs, and quite a big oil consumption; their little engines use about as much oil as a 10-hp car, so that they ought not to be neglected. They have various troubles—port blocking and exhaust system blocking; carbonaceous deposits in the combustion chamber; failure of crankshaft ball-bearings by wear or corrosion; spark plug bridging; and piston ring sticking and piston seizures, due to metallic contact or the filling up of the clearance with lacquer.

It is very difficult to get any sense out of two-stroke testing. These engines are very variable in their behaviour. In some engines, high viscosity index solvent-extracted oils give better results than medium viscosity index naphthenic type oils, and in other engines, the reverse is the case. Using the same engine, the oil results can be reversed by changing the conditions of test. If oils do produce port deposits, it is desirable that they form deposits of the type which break away before becoming so great as to reduce engine performance.

Fig 7 shows the reduction in engine speed due to blocking of the exhaust port, reducing the efficiency of the engine. The occasional increases in speed are due to the breakaway of deposits improving performance for a short time.

Fig 8 is the result of photographing the exhaust port at intervals during the running of a two-stroke engine on the road. The percentage of exhaust port area blocked increases to between 40 and 50 per cent; thereafter it fluctuates within those limits by build-up and breakaway of carbonaceous deposit. Incidentally, this performance has been repeated entirely, and it gives an almost identical curve. It is a delightful piece of repeatability from a road test and is the sort of thing which is rarely experienced.

Steam Turbine Additives

Various additives improve the performance of steam turbine oils. A comparatively recent development in the field of load-carrying additives is the production of steam turbine oils having superior load-carrying properties to protect highly stressed marine turbine reduction gearing. Additives for this purpose must be selected with great care, for the essential properties of steam turbine oils—oxidation stability, good demulsification value, and ability to prevent rusting in the presence of sea-water—must not be impaired.

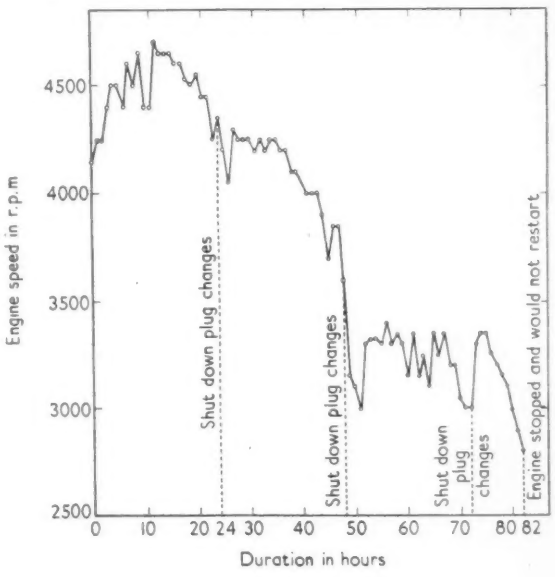


Fig 7

The increase in load-carrying capacity which can be achieved is shown in Table X:

TABLE X

Oil	Scuffing load, lb at 70° C, IAE gear test rig			Full-scale marine gearing of advanced design
	2000 rev/min	4000 rev/min	6000 rev/min	
Regular marine turbine oil A	60	40	25	Scuffed at 65 per cent full power torque
Oil A + load-carrying additives	125	105	100	No scuffing at 130 per cent full power torque

This development enables the gear designer to design smaller and lighter reduction gearing of higher unit loading and higher sliding speeds without risk of scuffing.

Oxidation and Rust Inhibitors for Steam Turbine Oils

It is convenient at this point to mention other additives used in steam turbine oils, more particularly oxidation inhibitors and rust inhibitors. The amines and phenolic compounds find their application here and by careful selection of stable base oil and suitable oxidation inhibitor, steam turbine oils are being made in the confident belief that the oil will never need to be discarded during the whole life of the turbine.

Water is often present in the lubrication systems of steam turbines. Good turbine oils, designed to separate water quickly, do not readily wet metal surfaces. Iron surfaces in the system can be wetted by water, causing rusting, and rust is a good stabilizer of water-in-oil emulsions. Certain surface active agents, introduced into steam turbine oils in very small proportions, have a quite remarkable effect in preventing rusting of the ferrous parts of the oil system, even in the presence of sea water. The mechanism by which these inhibitors act is interesting. They become absorbed on the metal surfaces, forming a barrier to the water and oxygen which cause corrosion. Thus they leave the oil, in which they were introduced to the machine, with the result that a sample of oil drawn from the turbine may give a bad result on a laboratory rusting test, yet the turbine is free from rusting because the inhibitor has "plated out" on the metal surfaces where it remains quietly doing its work.

Additives for Marine Diesel Engine Lubrication

In the smaller, high-speed, trunk piston engines, conventional heavy-duty oils containing anti-oxidant and detergent additives, are quite successful in keeping engines clean and piston rings free, and extending overhaul periods. Different conditions prevail in the large, slow-moving crosshead engines where the cylinders are lubricated by a mechanical lubricator. In the crankcase oils for these engines, anti-oxidants, in some cases of the turbine oil type, have given good results. Where corrosive combustion products have access to the crankcase oil, pitting of crankshaft journals is sometimes a problem which can be alleviated by the use of oil soluble compounds of basic properties to neutralize the acidic products of combustion.

In the large cylinders, especially when high viscosity, high sulphur content, boiler fuel is used, combustion chamber fouling and high rates of liner wear are experienced. The conventional detergent additives, even if basic in reaction, are not very successful, apparently because the lubricant is admitted to the cylinders in such small quantities that the amount of additive present is insufficient to cope with

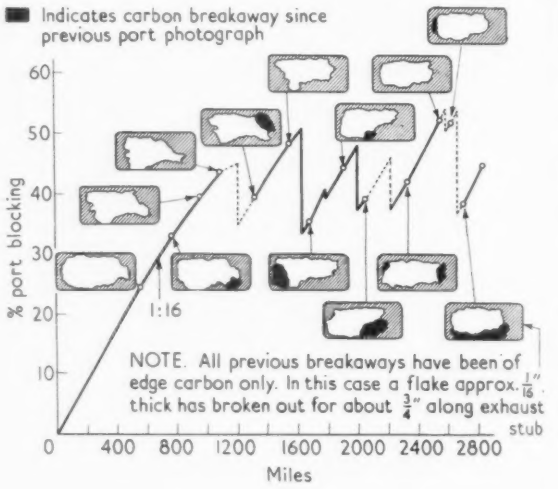


Fig 8

the deleterious combustion products. The problem is being tackled in several different ways:

(1) By making the cylinder oil highly alkaline by incorporating a relatively large proportion of strongly basic, oil-soluble organic compounds;

(2) By carrying high basicity into the oil by emulsifying therewith an aqueous solution of oil insoluble, water soluble salt;

(3) By introducing colloidal suspensions of inorganic compounds, *e.g.* chalk, into the oil.

TABLE XI

LISTER ENGINE TESTS

Oil—HVI 500 Solvent. Oil sump temp.—120° F. Cooling water outlet—115° F. Load—6 kw. Fuel, 2 per cent S.

Duration hr	50		100		96		50	
Cyl No	1	2	1	2	1	2	1	2
Additives	ZnO	Nil	Metal amino complex	Nil	Metal amino complex	Nil	$CaCO_3$	Nil
Ring loss, mg (total, 5 rings)	136	379	111	660	161	522	100	288
Ring groove lacquer (max 10)	9·6	1·6	7·9	0·2	7·6	0	9·9	2·0
Ring groove carbon (max 10)	10·0	8·8	9·0	3·5	10·0	5	10·0	6·0

These methods have shown promise in field service trials, resulting in reduced liner wear and cleaner engines.

It is extremely difficult to do any kind of laboratory testing at reasonable cost to predict the kind of results one would get from a large marine diesel engine. A twin-cylinder Lister engine was used and one of the cylinders mechanically isolated from the sump so that the sump oil was not contaminating the test cylinder oil supplied by a mechanical lubricator.

Table XI shows some results: in each test cylinder No. 1 was lubricated with additive oil from the lubricator, and cylinder No. 2 with pure mineral oil from the sump. In the case of ring groove lacquer and carbon 10 represents a perfectly clean piston.

With a 4500-bhp marine engine burning boiler fuel of 2·3 per cent sulphur content, the maximum cylinder wear in fifteen cylinders lubricated with conventional mineral oil was 0·21mm per 1000 hours, and only 0·096mm in five cylinder lubricated with an oil containing a strongly basic amino compound.

Gas Turbine Lubricants

The requirements of aircraft gas turbines in the way of lubricants present an immense field for additives, because they are constantly asking for what appears to be impossible by way of low temperature fluidity, extremely high temperature stability, and high load-carrying capacity. So there is plenty of scope for additives. There are anti-oxidants, load-carrying additives, and possibly detergents to clean up deposits from oils inadequately arranged from the point of view of oxidation resistance. The bases of these lubricants are not conventional hydrocarbons, but usually di-esters of sebacic acid or azaleic acid, and pelargonates. Table XII shows Four-ball machine results from esters treated with different additives. It particularly brings out the synergistic effect on load-carrying capacity of having both the phosphate ester (PE 12) and the sulphur compound (S4) together in the synthetic fluid.

TABLE XII
GAS TURBINE LUBRICANTS

Composition	*Load at incipient seizure, kg*	*Weld load, kg*	*Wear scar diam (mm) at load (kg)*		
			50	100	150
Ester + PE 20 ...	85	110	0·32	3·2	—
,, + PE 12 ...	85	130	0·32	2·5	—
,, + S4 ...	55	130	0·4	2·5	—
,, + PE 12 + S4	110	165	0·32	0·4	2·7

* * *

M.O.A. Approved HD Oils

The following additional oils have been approved by the Director of Chemical Inspection, Ministry of Aviation, as complying with the requirements of Defence Specification DEF-2101.

Supplier and supplier's nomenclature	*OMD grade of oil*
AB Nynas Petroleum:	
Ajcol DM 10W	40
Ajcol DM 20W/20	60
Ajcol DM 30	110
Ajcol MS 50	330
Aquila SpA:	
Aquiloil HSD 150	330
BP Trading Ltd:	
B.P. 3205	60
B.P. 2343	110
B.P. 2348	110
Arthur Browne & Co. Ltd:	
Idealite 30	110
Deutsche Erdol AG:	
DEA 3102	60
A. Duckham & Co. Ltd:	
—	110
Esso Petroleum Co. Ltd:	
—	60
—	110
G.E.R. Deurag Nerag:	
Nerag motor oil 810 HD Supp. 1 20/20W	60
Nerag motor oil 600 HD SAE 30 ...	110
Gulf Oil (G.B.) Ltd:	
Britgulf 10W HD oil	40
Manchester Oil Refinery Ltd:	
Supramor Mil 30 HD	110
Mobil Oil AG:	
Motrex 105 SAE 30	110
Motrex 105 SAE 50	330
Mobil Oil Ltd:	
—	40
—	110
—	110
—	110
Oelwerke Julius Schindler:	
Aristol HD SAE 10W	40
Aristol HD SAE 20W	60
Raffineria Olii Lubrificanti:	
Tonale HD/30—S1	110
Rafinerija Nafte Rijeka:	
Super HDS 1	110
Regent Oil Co. Ltd:	
GB1 E/A	110
Shell Co. of Australia:	
Shell X100 motor oil 10W	40
Shell International Petroleum Co. Ltd:	
Shell Oil S 5698	40
Shell Oil S 5787	110
Shell Oil S 5736	110
S 5607	110
H. C. Sleigh Ltd:	
Golden Fleece Mil Def 30	110
—	110
Sternol Ltd:	
Auto Deso HD 10W	40
Auto Deso HD 20/20W	60
Stevinson Hardy & Co. Ltd:	
SH(16) SAE 30 OMD 110	110
Wenzel & Weidmann:	
Ecubsol Hochleistungs Motorenöl HD 30	110
Wintershall AG:	
Salzbergener HD Motorenöl GL SAE 10	40

Cancellations

The following Qualifications have been withdrawn on expiry of the approved period:—

Nos. UKHD	314–315	355	415	536
	328	359	420	589
	330	365	423	1238
	332	387	451	
	334–337	396–397	499	

Around the Branches

ABADAN, BAHRAIN, ESSEX, FAWLEY, KUWAIT, LONDON, NORTHERN, SCOTTISH, SOUTH-EASTERN, SOUTH WALES, STANLOW, TRINIDAD, YORKSHIRE

Stanlow Branch

Chemicals from Coal

A joint meeting of the Stanlow Branch of the Institute with the Liverpool and North Western Section of the Royal Institute of Chemistry was held on 16 December 1959 at Blossoms Hotel, Chester.

The chairman, C. N. Thompson, introduced the speaker, C. E. Needham of Coalite and Chemical Products Ltd, who delivered a paper on "Reactive Smokeless Fuels and Chemicals from Coal".

The speaker first defined what was meant by reactivity and explained the critical air blast test used to measure this property. An explanation of low-temperature carbonization processes used to produce reactive smokeless fuels, *i.e.*, *Coalite* and *Rexco*, was given, and the NCB and Rochdale processes were also outlined.

Yields from the *Coalite* process per ton of coal processed were given as being:

	Coalite
Smokeless fuel	14–15 cwt
Crude gas spirit	3½ gal
Crude gas oil	16½ gal
Aqueous liquor	34 gal
Gas production	4000 cu ft
Btu/cu ft	700

The Rexco process was said to yield 13 cwt of *Rexco*, 18 gallons of oils, and a surplus of 25,000 cu ft low grade gas per ton of coal carbonized.

On the chemical side, the main primary products were a wide range of mono and dihydric phenols and their derivatives, which found wide application in the production of phenol/formaldehyde resins, antiseptics, selective weed-killers, pvc plastics, inhibitors, ore-flotation agents, etc.

Oil products included a gasoline of ON 85 Research clear, a diesel of Cetane No 32 which could be upgraded by blending with petroleum, fuel oils, and creosote. The pitch was largely used for the production of coloured mastic floors and tiles.

In conclusion, the lecturer summarized the beliefs on which the low-temperature coal carbonizing industry had been based.

(1) That the open-fire will continue as the most popular method of domestic heating in Britain.
(2) That Clean Air will arouse increasing public support and will, in fact, become the new way of life.
(3) That the cokes made by conventional high-temperature carbonizing processes are far too unreactive to satisfy the average housewife as a smokeless substitute for coal.
(4) That low temperature semi-cokes, being as reactive as coal in addition to being smokeless, will be readily accepted for the open fire—as in fact they already are.
(5) That it will become realized that the radiant efficiency of low temperature semi-coke is ⅓ higher than with coal, which cancels the difference in prices, leaving the semi-coke with advantages in consistency and cleanliness.
(6) To recover the smoke-producing materials from coal before burning it is the sensible thing to do, from everybody's point of view.

The discussion was opened by G. H. Turner, of the Royal Institute of Chemistry, and continued in a very lively manner until 9.40 p.m., when a vote of thanks was given by Dr Helena Bradbury, chairman of the Liverpool and North Western Section of the Royal Institute of Chemistry.

Rocket Propellants

The 142nd meeting of the Branch was held at Blossoms Hotel on 21 October. The chairman, C. N. Thompson, introduced the lecturer, D. Hurden, who, in the absence in the U.S.A. of Professor A. D. Baxter, had kindly agreed to deliver the talk on "Rocket Propellants".

The lecturer outlined the various types of propellant used which were said to be the solid or powder rocket, the pressure expulsion type (mono-propellant), and the turbo pump feed type (bi-propellant).

He then went on to explain in more detail the fuel requirements, these being black powder, plastic cordite, liquid hydrogen peroxide, nitro methane, kerosine, and hydrazine.

The use of fluorine as a propellant in the U.S.A. was also mentioned, as well as beryllium metal. Such properties as specific impulse were discussed, and those from mono-propellants were said to be normally low.

After a most interesting and informative discussion the meeting, at which there were 57 members and visitors present, terminated with a vote of thanks to the speaker by V. Biske.

Northern Branch

A meeting of the Northern Branch was held in the Engineers Club, Manchester, on 19 January. Despite inclement weather, some 35 members were present to hear J. F. Cameron of the Atomic Energy Research Establishment read a paper entitled "Industrial Uses of Radioactive Isotopes". The chair was taken by J. G. Provest, the branch chairman.

Mr Cameron gave a brief review of the properties of radioactive isotopes and radiation detectors, and then described three categories of use: thickness gauges, tracer measurements, and irradiation uses.

The first group, thickness gauges, consisted simply of a radioactive source and a suitable detector, and were used on materials ranging in thickness from thin sheets of paper to thick steel. The advantages of this method of thickness measurement were that it was non-contact and non-destructive. It was therefore used predominantly on continuously-produced sheet material such as paper, plastic, metal foil, cigarettes, etc. Variations of these instruments were used for the determination of the level and density of the contents of pipes, tanks, and other containers, for plating thickness measurement, and for analysis.

Radioactive tracer measurements constituted the second group. These were generally used as a complimentary technique to chemical tracers, but when it was impossible to take samples for analysis, measurements could often be made with the radioactive tracer. The determination of mixing efficiency, throughput rates, re-cycling conditions, and sand and silt movement were among the tracer experiments described.

The third group utilized the effects of radiation on materials, and amongst the topics mentioned were the sterilization of pharmaceuticals and chemicals and the pasteurization of foodstuffs.

After a lively discussion the meeting was closed by a vote of thanks proposed by the chairman.

* * *

IP STANDARDS

Since its first publication in 1924, *Standard Methods for Testing Petroleum and Its Products* has steadily increased in size and scope. Thus, the first edition comprised 102 pages and contained details of only 40 standard methods. The eighteenth edition (1959) gave full details of apparatus and procedures for 130 standard methods, and even then did not include the six methods for the engine rating of motor and aviation fuels.

With the object of limiting the size of the method book, and at the same time presenting certain groups of methods in more convenient form for users, it has been decided to issue the IP methods book in four parts. This change also coincides with the re-organization of the Standardization Committee, to which reference was made in our February issue. The opportunity has also been taken to change the title of the book to *IP Standards for Petroleum and Its Products*. The four parts are as follows:

Part I—Methods for Analysis and Testing

This will comprise all the general laboratory methods which form the bulk of the IP standard methods and will include also certain small-scale rig tests.

Part II—Methods for Rating Fuels—Engine Tests

In addition to the five knock-rating methods and the ignition quality of diesel fuels method, which were detailed in *IP Engine Test Methods for Rating Fuels*, and which have now been extensively revised, a method for an extended research method will be included. Supplements to the knock-rating methods also deal with standard reference fuels and engine maintenance.

Part III—Methods for Assessing Performance of Crankcase Lubricating Oils—Engine Tests

This part will include the Caterpillar 1-A test for engine cleanliness and wear (IP 124) together with three new methods for this determination using respectively the Caterpillar 1-D, the Gardner 1L-2, and the Petter AV-1. It will also give details of a method for oil oxidation and bearing corrosion, using the Petter W-1 engine, and a method for rating engine cleanliness and wear.

Part IV—Methods for Sampling

Method IP 51, which has been amended in some detail, forms this part.

Publication

Parts I and IV are now available, the respective prices being 42*s* (36*s* to IP members) and 10*s* (7*s* 6*d*), post free. Orders, together with appropriate remittance, should be sent to the IP at 61 New Cavendish Street, London, W.1.

It is anticipated that Parts II and III will be ready during 1960.

STAFF COLLEGE FOR SENIOR TECHNICAL TEACHERS

Sir Alexander Fleck, with the support of the Minister of Education, has appealed to industry to help in the establishment of a staff college for senior industrial staff and for senior teachers in colleges of technology and commerce. He is asking industrial and commercial firms to contribute £100,000 as a single, once-and-for-all contribution of which £60,000 has already been promised after private approaches to thirty firms. The running costs, amounting to about £30,000 a year, will be met from fees paid by local education authorities, so that the college would in the main be maintained out of public funds.

The college will provide a centre where the senior staff from all types of colleges giving technical and commercial education can exchange ideas and experience by direct contact and personal discussion with their colleagues from other colleges and with personnel from industry and commerce, universities, government, and other associated fields. The college will benefit industry and commerce directly by giving their staffs a closer link with the technical colleges, and indirectly by improving the quality of the young men whom they will recruit in the future.

In a letter to about 250 firms, Sir Alexander said that the proposal to establish a staff college was included in the recommendations of the report of the Willis Jackson Committee on the Supply and Training of Teachers for Technical Colleges, and has won the strong support of people in both industry and education, including the FBI Education Committee, the associations of local authorities and teachers, the National Advisory Council on Education for Industry and Commerce, and the National Advisory Council on the Training and Supply of Teachers.

The Willis Jackson Committee considered that there was a need at the top level of the technical teaching profession for men with the breadth of outlook, attitude of mind, and authority needed to exert a strong influence both within their own colleges and upon the industrial and commercial firms which they serve. Existing facilities for teacher training or for refresher courses could not be expected to provide the kind of experience which a senior teacher required to fit himself for posts of real responsibility.

The college is intended to be a small one offering a series of short courses of 2–4 weeks throughout the year, the first of which, it is hoped, would start before the end of 1961.

The numbers attending each course would be kept to probably not more than thirty. It is desirable that about two-thirds of these should be experienced teachers, the rest being a variety of people from associated fields. Each course would be devoted to some different major topic of concern to the technical colleges, having to do with the development of teaching methods, the organization of new courses, the emergence of new technologies, and the administration and organization of the colleges. There would be no "instruction" in these subjects. The participants would come to pool their own ideas and experience and learn from one another. But there would have to be a nucleus of permanent staff.

It is envisaged that the college would be a self-governing entity with its own governing body consisting of representatives of industry and commerce, of local education authorities, and teachers.

Personal Notes

F. P. Barribal

F. P. Barribal, M.B.E., M.Inst.Pet., the director of Mobil Oil Company Ltd in charge of retail sales, recently left for New York to take up a two-year appointment with Mobil International Oil Company. Whilst remaining a member of the board of Mobil Oil Company during this period, he will relinquish his executive retail marketing responsibilities. **J. F. Martin,** previously regional assistant, northern and south-eastern Europe, in New York, has been seconded by Mobil International to London, assuming the executive responsibilities as director of Mobil Oil Co. in succession to Mr Barribal.

In his new post in New York, Mr Barribal will study retail marketing planning activities and marketing operations in various overseas affiliates. On the completion of his two years abroad he will return to the U.K. to resume his executive responsibilities. Mr Barribal joined Mobil in 1926 and was elected to the board in 1957. Prior to this, he had held the post of general sales manager (automotive).

A graduate of Brown University, Providence, Mr Martin has been connected, for most of his working life, with the retail marketing activities of Socony Mobil Oil Company Inc. In 1957 he was appointed to his present position with Mobil International Oil Company, New York.

W. F. List, M.Inst.Pet., assistant managing director of C. C. Wakefield & Co. Ltd and of Wakefield-Dick Industrial Oils Ltd, completed 50 years with the Wakefield Castrol Group last February.

"Bill" List joined Wakefields as a laboratory assistant, and after the first world war went to India to assist in the opening of his Company's first overseas branch. In 1922, when he was 27, he was appointed manager for India. This position he occupied for 10 years before being transferred to the managership of the South African branch.

W. F. List

During the 1939-45 war Mr List undertook a number of public duties in connexion with the Dominion's war effort. For this service he received the King's Commendation in 1945.

In 1946 Mr List returned to England to become overseas general manager and, one year later, was elected to the Board. In 1952 he was appointed to his present position of assistant managing director.

W. H. S. Aplin, A.M.I.C.E., has retired from Plenty & Son Ltd after more than 20 years service. **J. F. Hall-Craggs,** who has been elected to fill the vacancy on the Board, is the director in charge of the Company's Filter and Chemical Plant Division.

E. S. Sellers, M.A., M.Sc., M.I.Chem.E., F.Inst.Pet., formerly professor of Chemical Engineering at the University College of Swansea, University of Wales, has joined The British Petroleum Company. As from 28 March he becomes manager of the Petroleum Division of the Company's Sunbury Research Centre in succession to **W. M. Catchpole,** M.A., F.Inst.Pet., whose new appointment will be announced later. Mr Sellers previously served with the Company in Iran from 1935 to 1938, and has held a number of other industrial and university posts.

The appointment of **Norman L. Dickinson** as manager of process engineering, has been announced by Kellogg International Corporation, London. In his new position, Mr Dickinson will be responsible for the analysis of plant problems, and planning and executing the process engineering required to design petroleum refineries, chemical plants, etc.

N. L. Dickinson

Previously manager, Refinery Plans Division, The M. W. Kellogg Company, New York, Mr Dickinson has been with the Kellogg organization since 1940, and was formerly a technological engineer with Shell Oil Co. His many responsibilities have varied from managing the engineering and design of synthetic detergent plants to advancing the commercial acceptance of naphtha as a low-cost olefin source. During the second world war, he was attached to the Manhattan Project and was one of the developers of the process to produce Uranium 235.

Mr Dickinson was a graduate in chemical engineering from the University of Michigan in 1937. He is a member of the AIChE, API, RESA, and AOA, and was co-author of a chapter in the Institute of Petroleum's *Annual Review of Petroleum Technology*.

Executive changes in the Lubricants Department of Shell-Mex and B.P. Ltd and its associated company, Scottish Oils and Shell-Mex Ltd, are announced. **Leslie H. Davis,** A.M.I.Mech.E., lubricants supervisor and assistant to the lubricants manager, Scottish Oils and Shell-Mex Ltd, has been appointed lubricants manager, Southern Division, Shell-Mex and B.P. Ltd. **W. W. Harrow,** lubricants supervisor, Dundee Branch, succeeds Mr Davis as lubricants supervisor.

W. J. Gooding, A.M.Inst.Pet., retired as lubricants manager, Southern Division, Shell-Mex and B.P. Ltd, on 31 January.

N. P. W. Moore has been appointed secretary of the British Section of the Combustion Institute, in succession to Dr J. S. Clarke. Mr Moore's address is Mechanical Engineering Department, City & Guilds College, Exhibition Road, London, S.W.7, and correspondence concerning Combustion Institute matters should be sent to him at that address.

Dr C. G. Williams, M.I.Mech.E., F.R.Ae.S., F.Inst.Pet., director and general manager of "Shell" Research Ltd, has been nominated by the Council of the Institution of Mechanical Engineers as a member of the Board of Studies in Engineering of the National Council for Technological Awards.

The National Council, the chairman of which is Lord Hives, is concerned with the recognition of Colleges of Advanced Technology and the awards of the Diploma in Technology.

Dr Williams' membership of the Board of Studies in Engineering will terminate in October 1961.

Richard Miles, chairman and managing director of Head Wrightson & Co. Ltd, retired on 31 January 1960. He remains on the Board of the parent company. **Sir John Wrightson,** Bt, vice-chairman and managing director, has been appointed to succeed him.

Paul T. Atteridg has been appointed manager, Refinery Plans Division, of the M. W. Kellogg Co., New York.

Before his recent appointment, Mr Atteridg was section head, Process Development, in the Company's R & D Laboratories, Jersey City, N.J., where he was in charge of pilot plant experimentation. He joined Kellogg in 1947, and has since performed a variety of laboratory process studies for clients.

P. T. Atteridg

Mr Atteridg holds degrees in chemical engineering from Cornell University, and did post-graduate work in Brooklyn Polytechnic Institute.

* * *

Garages and Motor Spirit Prices in Britain

The recent cuts in the retail price of motor spirit sold by some independent garages in West Germany, and the price reductions made by dealers in Preston and a few scattered locations in Britain, form the basis of a feature in the *Financial Times* of 2 February, entitled "Pumps, Shillings, and Pence."

It was said that prices had been recently cut at Preston by 3*d* to 4*d* a gallon—a reduction of over fifty per cent of the dealer's profit margin. Since in this instance the motor spirit thus sold originated from the major oil companies, and was indeed only an occasional deviation from the universal recommended price, the companies were not regarding this as a very serious issue.

This was cited in contrast to the situation in West Germany where independent garages—which constituted some 15 per cent of the total—had cut the retail price by about 5*d* a gallon having obtained their cheaper motor spirit supplies from independent sources. This had forced the major companies to follow suit.

In Britain, it was said, independent garages numbered only 7 per cent of the total. Wholesale prices of motor spirit to garages were determined by the oil companies but there was merely a recommended retail price. The dealers' official margin was said to be 5*d* for standard grade, 5¾*d* for premium, and 6¼*d* for high octane.

The question of rebates on the wholesale price of motor spirit was discussed. These were said to vary for the independent dealer from maybe nothing at all to about ⅝*d* per gallon, depending on throughput volume. The usual rebate on premium grade to a "tied" garage owner was 1¼*d*, and on standard grade 1¼*d* or 1*d*. It was estimated, the writer said, that unless a dealer was selling 50,000 gallons a year, with the usual retail margin and a rebate averaging ⅞*d*, he could not run his garage solely on sales of motor spirit.

In a discussion of the actual retail price of motor spirit in Britain it was pointed out that owing to the large fixed item of 2*s* 6*d* per gallon in tax, increases of a penny or so a gallon made little difference to the final price but a great difference to the oil company, which was selling (minus tax and dealers' rebate) at a wholesale price of 1*s* 7¾*d*. The profit to the oil company—which had to cover distribution costs in Britain as well as overheads—was therefore "about 6*d* on one gallon of premium, and 3¼*d* on one gallon of standard".

The contribution of the various marketing companies in the number of garages in Britain (said to number about 36,000) was partly estimated. "Shell-Mex and B.P. (either jointly or separately) probably own one-third and Esso and its associate Cleveland one-sixth". These companies were thus said to control between them a total of three-quarters of total garage motor spirit sales. The other marketing companies were listed but their respective participations were not estimated.

The article concluded with the observation that with refinery output patterns amenable to only slight variations, the growth in demand for fuel oil at a greater rate than that for petrol seemed to be leading to the problem of the disposal of mounting stocks of motor spirit. "This may in turn lead to cheaper petrol at the pumps more effectively than can be achieved by the price-cutting at Preston."

An illustrated breakdown was also given of the *Financial Times*' estimated cost of a gallon of premium grade motor spirit in the inner zone, refined from Persian Gulf crude oil. The division of costs was as follows:

	s	*d*
Tax	2	6
Dealer's mark-up		5¼
Dealer's rebate		1¼
Distribution and profit		6
Refining, etc.		7
Freight		1½
Crude oil		5
	4	8½

★ ★ ★

"Teaching Corrosion Science to Engineers"

An all-day conference on "Teaching Corrosion Science to Engineers", is to be held by the Corrosion Group Education Panel of the Society of Chemical Industry at 14 Belgrave Square, London, S.W.1, on 22 April 1960.

Topics to be discussed in the three papers will include: a systematic corrosion course for graduates in engineering, chemistry, metallurgy, etc.; how engineers should seek information on corrosion prevention; and training engineers in cathodic protection design.

Notes of the Month

Chemical Pipeline to Link Fawley and Severnside

Esso Petroleum Company has concluded an agreement with Imperial Chemical Industries for the supply of ethylene direct from the Esso refinery at Fawley to the new Severnside works of ICI in south Gloucestershire, three miles north of Avonmouth.

Permission is now being sought from the appropriate authorities to lay a pipeline between Fawley and Severnside which is estimated to cost about £800,000. The pipeline would be the first of its kind in Great Britain to link physically an oil refinery and a large chemical plant, more than 70 miles apart, for the direct supply of intermediate raw materials.

The pipeline would be buried to a minimum depth of 2 ft 6 in and its route would cross several railways, roads, rivers, and canals. It would be of welded construction and fully protected against corrosion. It is hoped that construction will commence towards the end of the year, and be completed by the end of 1961.

To supply ethylene to ICI, and to meet increasing demands for other additional feedstocks, the £10 million chemicals plant at Fawley refinery will be expanded. This will involve an additional capital investment of £5½ million. Construction of this new plant, which will include another steam cracker, is expected to start soon and to be completed by next year.

At ICI's new thousand-acre site at Severnside construction work on the first plants will begin in the spring, and production is expected to be commenced in about two years' time.

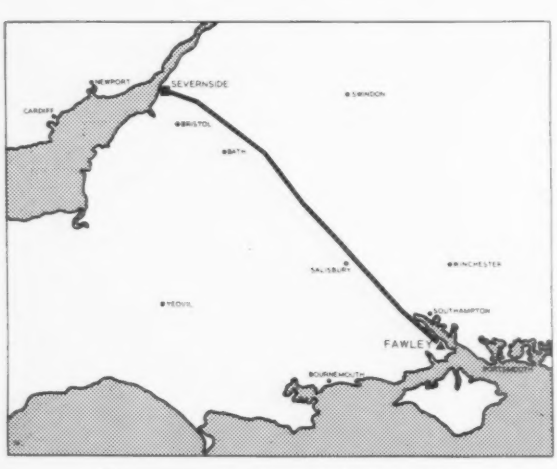
Although the announcement suggests a departure from ICI's present naphtha-pyrolysis method of producing ethylene, the apparent departure is in fact brought about and dictated by the need to extend manufacture as rapidly as possible under the favourable conditions now obtaining.

ICI was anxious to develop the site quickly. So far as petrochemicals were concerned, it was seen that while an integrated scheme of the Wilton type was not called for at present, nevertheless a most important opportunity of broadening the base of its petrochemical operations was ready to be grasped, providing the right source of ethylene was available.

When the demand for other olefins is established at Severnside, and when the ethylene offtake is great enough to support a large modern olefin plant, ICI is likely to return to the manufacture of further quantities of ethylene by naphtha-pyrolysis at Severnside, though naturally it is impossible to be precise as to the manufacturing pattern which will develop in the next decade.

The first stage of construction on the site, which will be known as Severnside works, will involve spending about £5 million on the initial site development and on the construction of plants for making 35,000 tons per annum of ethylene oxide, ethylene glycol, and associated products. The ethylene oxide will be made by the air oxidation process developed by Scientific Design Company Inc, who will also design the plant. The plants for ethylene glycol and associated products will be designed by ICI's own staff. The direct air oxidation process chosen differs from the alternative oxidation process in that air and not pure oxygen is used, and from the chlorhydrin process—already well established at Wilton—in that chlorine is not employed. The Scientific Design process was selected after full consideration of the three processes, when it was decided that this fitted the local circumstances best.

The general pattern of development of this works is expected to resemble in many respects that of ICI's Wilton works in north Yorkshire, where more than £100 million has been spent since 1949.



The route of the chemical pipeline project

Jet Fuel Pipeline at London Airport

Pipeline delivery of aviation fuel to London Airport began in March by two 6-in diameter pipelines, running nine miles underground from a depot at Walton, delivering into two of Shell-Mex and B.P's storage points at the airport.

They will help to meet the rapidly rising demand for aviation turbine fuels by the inter-continental planes of the jet age. Total fuel deliveries by Shell and BP aviation services to aircraft at London Airport are expected to increase this year by a third compared to 1959; nine-tenths of the increased throughput will be aviation turbine fuel.

Hitherto road tankers have fed London Airport from the Shell-Mex and B.P. storages at Purfleet and Shell Haven. Over the year a daily average of 40 tankers have been needed for the round trips of roughly 80–100 miles to the airport and back. At peak periods during the summer, 60 tankers a day were needed to meet the heavy fuel demand from holiday passenger aircraft.

The new pipelines, which will pump initially at about 30,000 gal hr, will ensure adequate supplies in all weather and traffic conditions.

At first, the aviation turbine fuel will be delivered into storage at the Walton depot, on the south side of the Thames, from Shell-Mex and B.P's installation at Hamble, in Southampton Water. Later in the year it is planned to provide also for the piping of supplies to Walton from Kent refinery along the 65-mile Government pipeline built during the war. This pipeline, which runs south of London from the Isle of Grain to Walton, is now being renovated and transportation

along it will be charged to Shell-Mex and B.P. by the Government.

The Company's twin pipelines run roughly north-west from the Walton depot. After 6½ miles they enter the airport perimeter at the southern corner and branch into two main pipelines leading to Perry Oaks storage point and thence to the fuelling vehicles, and one spur line supplying the maintenance area depot.

Pumping along the pipelines will be controlled initially by a private telephone system linking Walton, Perry Oaks, and the maintenance area depots. Later, pumping will be remotely controlled, using automatic pumps.

Work on the project started at the end of last September, following the Royal Assent to the Shell-Mex and B.P. (London Airport Pipeline) Bill.

Attock Oil Company Operations

In a statement from Attock Oil Company Ltd it is reported that the Company's crude oil production during 1956 amounted to 1,597,522 brl, an increase of 36,613 brl over the previous year. Throughput at the Rawalpindi refinery in 1959 averaged 5519 bd. A 35-mile extension to the Dhulian refinery gas line is being laid to carry Dhulian gas to local undertakings. The increased offtake of surplus gas is expected to commence within the first three or four months of this year.

The deep test well at Dhulian has reached 8520 ft after delays in prolonged fishing and sidetracking operations.

Production of the Karsal field in 1959 was 21,450 brl, of which Pakistan Oilfields Ltd (Attock Oil Co's Pakistan subsidiary) shared one half.

A large volume of high-pressure waters has caused a temporary suspension in drilling at Chak Beli Khan, whilst the well at Mahesian has reached a depth of 7545 ft. The joint test with Pakistan Petroleum Ltd in the Domanda area which is being drilled by that Company has reached a depth of 2879 ft.

Drilling at Nahorkatiya

All the three wells completed at Nahorkatiya so far in 1960 have proved to be successful. This makes a total of 66 wells drilled by the Assam Oil Company drillers at Nahorkatiya and Moran, the Oil India Private areas in Upper Assam.

Wells Nos. 55 and 56, drilling of which began at Nahorkatiya early in February, are progressing satisfactorily. Preparations for the drilling of Well No. 57 are also afoot.

Exploration in Australia and Guatemala

The stockholders' progress report issued by Magellan Petroleum Corporation for 1959 includes some interesting details on exploration activity in Australia. It is noted that with the increasing interest in Australia's petroleum prospects that has been shown by many leading oil companies and others in recent months, all of the desirable acreage in the Great Artesian Basin is now under concession. The report, in addition to giving information on Magellan's survey activities, includes a map of all concessions held in the Basin by the various companies.

The report concludes with a short account of exploration activities in which Magellan is interested in the Peten Basin of Guatemala. At the time of writing two separate shows of oil had been made near concessions held by the Company—at Atlantic Refining Co's San Francisco No. 1A and at Ohio Oil Co's Chinaja No. 1.

BP Concession in Alaska

T. A. D. W. Hillyard discusses the survey areas with Dr P. E. Kent

BP Exploration Company (Alaska) Inc has been granted leases on about 50,000 acres in the Umiat region of Alaska, and has options on a further 120,000 acres in the Umiat and Gubik areas plus a small area in the Copper River Basin in the south.

The Company intends to employ a field party of three geologists plus three assistants in Alaska during the summer of 1960.

BP has also taken an interest in a deep test well being drilled by Paul G. Benedum in the Nulato Basin, adjoining the Yukon River in western Alaska.

BP Exploration Company (Alaska) Inc is registered in Delaware with offices in New York and Anchorage. Dr P. E. Kent, who is president of the Company, is one of BP's senior geologists and has served in Iran, Papua, East Africa, the United Kingdom, and Canada.

T. A. D. W. Hillyard is in charge of the Anchorage office. He was previously in the Calgary office of Triad Oil Co. Ltd. He joined that Company after a long spell in the Middle East, where he was concerned with negotiations relating to BP interests in the Abu Dhabi offshore concessions in the Persian Gulf.

UK Oil Production

During 1959 crude oil production from BP's English oilfields totalled 82,636 tons. Most of these fields are in the Nottingham area.

New Saharan Concession

The Société des Pétroles de Valence, in which the BP Group has a 50 per cent interest, has been granted a new permit to search for oil in the Algerian Sahara. This covers 1200 sq km near El Barga in the East Saharan Oasis department.

The Company's first test well in the Sahara, which is being drilled at El Arich el Megta in the Djorf el Atfal permit area, had reached 4600 ft by February. Three geological survey parties are operating in the Fort Polignac area in the extreme south-eastern Sahara.

BP's Angle Bay Project

The accompanying picture shows the super tanker terminal which is being developed by The British Petroleum Company at Angle Bay, Milford Haven. Later this year, when the £6,500,000 terminal is completed, it will provide deep-water berthing facilities for ships of 100,000 dw tons.

Shore developments have been planned to blend into the picturesque West Wales coastline. To do this the Company are reconstructing a Victorian fort at Popton Point (seen on the left of the photograph) where ships' bunkering tanks, ancillary equipment, and essential services will be accommodated. A hutted encampment on the right of the fort will eventually be cleared and the land re-instated. The terminal is linked to the BP refinery at Llandarcy, near Swansea, by a 60-mile long pipeline which was completed last December.

Fawley Operations in 1959

The year 1959 was a record one for Esso's marine operations at Fawley jetty, and 4896 tankers either discharged or loaded a total of 23,653,000 tons of oil. Since the refinery was opened in 1951 over 130 million tons of oil and more than 30,000 ships have been handled.

The jetty itself was extended during the year by the addition of No 5 berth, designed to handle ships of up to 77,000 tons dw and with a draught not exceeding 40 feet. The total length of the jetty is now 4400 feet, making it the longest oil jetty in the United Kingdom.

The actual refinery throughput for the past year was 10,931,000 tons, also a record.

Catalytic Cracker for Dinslaken Refinery

A catalytic cracking plant is to be built at BP's new refinery now nearing completion at Dinslaken in the Ruhr, Western Germany, for the production of high octane gasoline components.

This plant and its associated units will be in addition to the main refinery project which is due for commissioning next June.

The cracking plant will have a capacity of 10,000 bd, and to provide feedstock, a vacuum distillation unit will also be installed. Another part of this additional project is a 100,000 ton per year bitumen plant which will process the heavy residue from the vacuum unit.

Design work is now starting on these new units and it is expected that the cat-cracker will be commissioned in the middle of 1961.

Catalytic Reformer

A catalytic reformer, with a processing capacity of 1 million tons of oil yearly, is to be built at Abadan over the next two years by the Consortium's Iranian Oil Refining Company.

The new plant will produce high octane components essential for the manufacture of premium quality motor gasoline. Its installation will ensure the refinery's competitive position in the world market as demand for high octane fuel increases. Products from Abadan also supply the rapidly-growing Iranian internal market, which has increased during 1959 by 17 per cent to over 3 million tons annually.

Styrene Expansion by Cosden Petroleum

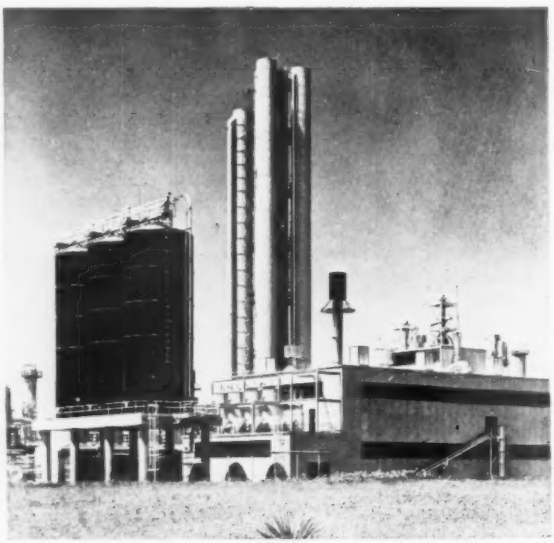
Cosden Petroleum Corporation is to construct new facilities which will triple its styrene capacity at Big Spring, Texas, to 60 million pounds annually when completed late this year.

Contract for the design, engineering, and construction of the entire project, which includes additional facilities for styrene monomer production and the U.S.A.'s first Alkar unit, has been awarded to Badger Manufacturing Company, Cambridge, Massachusetts.

The additional ethylbenzene required for the styrene unit will be furnished by the Alkar unit, which will utilize Universal Oil Product Company's process for ethylbenzene manufacture through catalytic alkylation of benzene with ethylene. Ethylbenzene is the precursor for styrene. Since all of the ethylbenzene available at Cosden's Big Spring refinery is presently being recovered and converted to styrene, this expansion programme required a new source, which is to be met by the Alkar unit.

The Alkar process, announced by UOP in May 1959, uses a fixed bed catalyst system that gives complete conversion of low purity ethylene found in the residue gas of a cracking unit. Benzene will be supplied from Cosden's BTX unit.

Cosden Petroleum Corporation's Big Spring, Texas, polystyrene unit. The tall towers in the background are part of Cosden's styrene monomer unit



Dewaxing Unit for BP German Refinery

A new dewaxing unit is being erected at the Neuhof refinery, near Hamburg, of Oelwerke Julius Schindler GmbH, one of BP's associate companies. The plant will have a capacity of 350 metric tons a day, and will produce high viscosity lubricating oils. The new dewaxer, with its ancillary equipment, will cost £1·7 million and will be operating in 1961.

Refinery to be Built at Lourenco Marques

Procon (Great Britain) Ltd has been awarded a contract by Sociedade Nacional de Refinacao de Petroleos (SONAREP) to build Mozambique's first refinery at Lourenco Marques. SONAREP is a subsidiary of the petroleum marketing firm, Sociedade Nacional de Petroleos (SONAP), a Portuguese company.

Cost of the project has not been disclosed, but complete fuel oil, kerosine, and gasoline production facilities will be built. Refining units will include a 12,000 bsd crude unit, a 2500 bsd Platforming unit, 2000 bsd diesel fuel Unifining unit, a 1500 brl Merox unit for the removal of sulphur compounds from gasoline and naphtha, and supporting facilities. Platforming, Unifining, and Merox processes are licensed by Universal Oil Products Company.

Completion of the refinery is expected in early 1961. The crude unit is being designed by Procon Incorporated, with purchasing, engineering, and construction by its British subsidiary.

Design of the refinery is keyed to Mozambique's traditional role as a major refuelling station and re-exporter of heavy fuel oils. Crude will be supplied to the refinery from Middle East fields.

Construction of its first refinery highlights the rising economy and increasing fuel consumption of the country. Domestic use of petroleum products has risen steadily in recent years and currently is about 3000 bd. Consumption ratios are about 40 per cent motor fuel, 40 per cent heavy fuel oil, and 15 per cent kerosine, with the remainder accounted for by lube oils and miscellaneous products. In addition to domestic consumption, large volumes of heavy oil have gone to Mozambique for refuelling of ships and re-export to the United Kingdom, Portugal, and the U.S.A. Currently, about 85 per cent of all oil imports are from Aden, Iran, and Saudi Arabia.

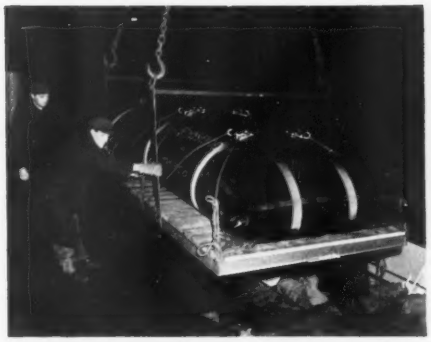
Electricity by Gas Turbine for Upper Assam

A gas turbine will shortly be employed for the first time in India to generate power and light at Nahorkatiya, Upper Assam. The generators that produce the electricity will be driven by gas turbines burning natural gas from the fields in the area.

Two turbo-alternator sets, designed to produce 1790 kW each at maximum rating, will be used in the power station now being built at the Zaloni industrial area.

Natural gas is an ideal fuel for industrial gas turbines because it offers few problems from the combustion viewpoint and does not give rise to harmful ash products. Among the many advantages of turbines are their mechanical simplicity, compactness, relatively light weight, freedom from vibration, and absence of necessary cooling water.

North Sea Trials of Flexible Tank



A trial shipment of liquid by "Portolite" flexible tank across the North Sea was successfully undertaken recently by Marston Excelsior Ltd, the manufacturers of the tank, in collaboration with the Holland Steamship Company and the British Amsterdam Maritime Agencies Ltd, Hull. The tank, lashed to a hatch in the bows of the Holland Steamship Company vessel, the MV *Rijnstroon*, behaved perfectly throughout the trip, even during a force eight gale.

The 750-gallon "Portolite" tank, on its pallet, was hoisted aboard the MV *Rijnstroon* at Hull and secured in the bows on top of No. 1 hatch cover. This had been chosen as the most suitable position, as there it would be subject to the maximum amount of motion; datum lines were marked on the tank, pallet, and hatch cover, and checks for movement were made at regular intervals throughout the voyage. In spite of the vessel pitching 8–10 ft at eight-second intervals and rolling 25° every 6 seconds, the tank did not move during the entire voyage.

At Amsterdam the tank was off-loaded and emptied on the docks, and then refilled and returned to Hull. This time the sea was much calmer, and once again the tank travelled perfectly.

The trial has proved that it is a practical proposition for producers in Britain to consign liquids by land and sea direct to consumers on the continent without the need for specially-tanked vehicles. The cost of the alternative method of trans-shipment, by drums, can also be obviated.

British Petroleum Equipment for Mexico

G. V. Sims, director of the Council of British Manufacturers of Petroleum Equipment, and managing director of British Oil Equipment Credits Ltd, left for the United States and Mexico recently to negotiate the extension of the present financing agreement with Petroleos Mexicanos.

Firm orders of £2½ million have already been placed against the original financing agreement which extended credit to £3½ million.

Record Digboi Throughput

The Assam Oil Company refinery at Digboi achieved a record level of throughput in 1959. The total of 118 million gallons was 3,507,073 gallons more than that for 1958 and was the highest in its 60-year history.

The refinery, the oldest in the Indian sub-continent, is still the only petroleum refinery there processing indigenous crude oil.

New Marine Turbine Lubricants for Ship's Gears

At the Thornton Research Centre of "Shell" Research Ltd in Cheshire, engineers have been making an intensive study of the lubrication requirements of ship's reduction gears. These are in some cases 14 ft in diameter and may take a year to make.

The most critical period of their entire working lives occurs during the initial running-in period, for in spite of all the care taken in their manufacture and installation, it is impossible to have contact over the whole tooth area. As a result only a small part of the gear-tooth area carries the load. Should this be too small a portion of the total area, local overloading may occur, leading in some cases to pitting and scuffing.

The investigations at Thornton led to the development of an oil for use on warships with case-hardened gears, which require a lubricant of a higher load-carrying capacity than is provided by normal types of turbine oils. The same oil is now being used extensively in merchant ships during the running-in period and acceptance trials.

It has been found that not only does this oil prevent damage during running-in, but it also assists the gears to run-in more rapidly and effectively by means of its chemical polishing action. Once the critical early period of life is over, lubrication can be continued with normal turbine oils.

Since it is impossible to follow changes in the gear surface by measuring such large gears in the laboratory, Thornton makes plastic impressions of the tooth surfaces which can be examined in a profilometer. In this way, a continuous record is kept of the variations in gear surfaces under study.

The Esso Tanker Fleet

The tanker fleet managed by Esso Petroleum Co. now amounts to 68 ocean-going ships, both owned and chartered, with a tonnage of 1,610,000 dwt, ranging in size from 2300 to 46,000 dw tons. In addition there are 25 coasters and estuarial vessels of less than 2000 tons in regular service.

£10 million was spent in 1959 on new Company-owned vessels, including four super-tankers each of 36,040 dw tons. In the ten years ending 1963, £64 million will have been invested by the Company in new tanker tonnage.

It is interesting to note that during 1959, a year of acute world-wide shipping depression, no ship owned by Esso Petroleum Company was sold, scrapped, or laid up.

Commercial Dracone Company Formed

The Dracone, a flexible towable container, and a revolutionary British development in the carriage of cargoes by water, first evolved by a group of Cambridge scientists four years ago, is to be launched commercially throughout the world by a new company called Dracone Operations Ltd.

The new company is backed mainly by associates of Hambros Bank, one of the City's leading merchant banks, and of H. Clarkson and Company, the ship brokers. Dracone Operations is also associated with Dracone Developments Ltd, an off-shoot of the Government-backed National Research Development Corporation, which first sponsored the development of the flexible sea-going container.

The chairman of Dracone Operations is Admiral Sir John Eccles, who is also a director of Dracone Developments and H. Clarkson & Co. With him on the board is Professor W. R. Hawthorne, who with Sir Geoffrey Taylor and John Shaw of Cambridge University, conceived the idea of the Dracone. The other directors are Dr B. J. A. Bard, an executive member of the NRDC and vice-chairman of Dracone Developments, W. H. A. Pritchard-Gordon, a director of H. Clarkson and Co., and L. C. Grand of Hambros Bank.

Dracone Operations Ltd is now associated with P. B. Cow Ltd and the Frankenstein-Beaufort organization in the manufacture of these containers. Dracone Developments Ltd will continue with its research and development work with the assistance of the NRDC.

Esso Petroleum and Imperial Chemical Industries both co-operated in successful trials last year and they were also successfully employed by the Army last October in Operation Softline at Milford Haven.

Dracones, whose capacities at present range from 15–320 tons, are already being used commercially in the United Kingdom and are employed by oil and transport companies in Nigeria and the Far East.

It has no compartments. It has one skin made of strongly-woven nylon, proofed inside with Acrylonitrile rubber and coated outside with Neoprene. The outer surface has a very high resistance to abrasion, sunlight, and salt water, and will withstand a great deal of chafing, particularly under water.

Among the other advantages claimed are the fact that the freight for a 320-ton Dracone shipped from U.K. to West Africa is around £450, whereas freight on a 250-ton steel barge built on the Continent and shipped to West Africa is around £3000; and its reduced draught—a 320-ton Dracone filled to 80 per cent capacity has a draught of only 4 feet.

DRACONE STATISTICS

Type letter	*Capacity at 0·8 sg*	*Capacity*	*Length*	*Diameter*	*Max. draught*	*Draught at 80 per cent filling*	*Empty weight*	*Width of Dracone reel*	*Diameter of reeled Dracone*
	tons	*gal*	*ft in*	*ft in*	*ft in*	*ft in*	*ton cwt*	*ft in*	*ft in*
B	15	4,500	70 0	4 0	3 0	1 7	– 10	7 0	5 6
D	35	10,000	100 0	4 9	3 7	2 0	1 3	9 0	6 6
F	100	28,000	140 0	6 9	5 1	2 8	2 0	12 0	7 0
K	320	90,000	200 0	10 2	7 8	4 0	6 0	17 6	8 0

These figures are approximate and intended for guidance only. The data are based on cargoes with a specific gravity of 0·8. Capacity in tons is of course proportionally greater for denser cargoes.

First BP Tanker Launch in 1960

The first tanker to be launched for BP in 1960, the 15,500 dw ton *British Curlew*, went down the slipway at the Clydeside yard of Alexander Stephen and Sons Ltd on 12 January.

Mission to Argentina and Chile

A mission to Argentina and Chile has been formed by the CBMPE with the active encouragement of the British Chamber of Commerce in the two countries, and with assistance from HM Representatives locally and of HM Government in the U.K. It is believed the visit will prove valuable in furthering an important sector of British trade in this area.

Its terms of reference are:—

(a) to introduce the potential of the British petroleum equipment industry fully to Yacimientos Petroliferos Fiscales, Empresa Nacional del Petroleo, and other oil companies operating there;

(b) to investigate thoroughly the opportunities available in the category of capital goods;

(c) and to discuss the possibilities of credit facilities if they are required.

The mission will be composed of E. F. E. Howard (Hayward Tyler & Company Ltd), immediate past chairman of the Council and chairman of British Oil Equipment Credits Ltd; L. S. Dawson (Oil Well Engineering Company Ltd), a member of the executive committee of the Council and a director of British Oil Equipment Credits Ltd; Gordon Goodrich (sales manager, Oil Division, Stewarts & Lloyds Ltd); and D. S. Barwell, representative in Central and South America of Newman, Hender & Company Ltd, B.K.L. Alloys Ltd, and Kirk & Company (Tubes) Ltd.

New Departments at BP's Head Office

Three new departments have recently been organized in the London head office of British Petroleum. The new departments have been formed from the three divisions of the present Refineries and Technical Department.

The Refineries Division will become Refineries Department. J. Moffat has been appointed general manager of this department and D. W. K. Barker and Dr T. Tait, F.Inst.Pet., assistant general managers.

The Research and Development Division will be renamed Research and Technical Development Department, with P. Docksey, F.Inst.Pet., as general manager. The present Patents, Licensing, and Trade Marks Branch will become Patents and Trade Marks Division of this second new department.

Engineering Division will become Engineering Department, of which R. C. Thompson, M.Inst.Pet., will be general manager, and Dr W. Pratt assistant general manager.

The general managers of each of the three departments will be responsible to M. A. L. Banks, F.Inst.Pet., as a director of BP Trading Ltd.

BP's Purchases

During 1959, BP Trading Ltd placed orders for materials, equipment, and services to the value of nearly £12,200,000. Of this total, orders worth £11,100,000 were placed in the United Kingdom, nearly 50 cent being for export.

In addition, refineries and other main subsidiaries of BP in the United Kingdom placed during the year orders valued at almost £4 million to cover their local requirements. Shipment of materials to overseas destinations by sea and air covered approximately 26,000 consignments amounting to more than 106,000 tons, at a freight cost of about £940,000.

Swedish Representative in Olympic Games

Barbro Martinsson, an assistant at a BP service station in Skelleftea, Sweden, represented her country in the women's cross-country ski events in the Olympic Winter Games, held at Squaw Valley, California, recently

Esso Fuel Tests in the Arctic

Esso Research Ltd has a team of vehicles at Kiruna, Sweden, within the Arctic Circle, to study fuel problems at continuous temperatures as low as −30°C in conditions which cannot be reproduced satisfactorily under artificial refrigeration. The test vehicles in these field trials include lorries, cars, and agricultural tractors. Tabulated results are obtained on fuels and fuel systems operating under the coldest conditions in which they are likely to be called upon to function.

As a result of previous work at Kiruna and the Bavarian Alps, vehicle manufacturers both in the U.K. and Europe have been advised of a number of simple fuel system modifications that could be effected to improve efficiency.

The Pipeline Industries Guild

The Pipeline Industries Guild were pleased to have T. J. Boddington, B.Sc., M.I.C.E., as their speaker on the 12 January at Caxton Hall, when he spoke on "Some Aspects of Pipelines".

He said that England's health, livelihood, and wealth, depended on water, and without pipelines there would be no means of transporting it. Pipelines of various forms had been used by man since time immemorial, from wooden pipes made by boring tree trunks, stone pipes, old tapered gun barrels made for war which were joined to make a cast iron pipeline, sheet lead rolled into pipe form by the ancient Romans, to the present-day, where cast iron, steel, concrete, and plastic were all used for transporting fluids.

Water authorities in England and Wales supplied every day in 1959 over 2300 million gallons of water by pipelines totalling 120,000 miles in length, at a cost of 1*d* per head of the population. He spoke of methods of jointing, corrosion, and remedial measures such as cathodic protection, costs of pipes, and laying charges.

A vote of thanks was proposed by S. J. Manning on behalf of the members of the Guild for an interesting and informative lecture.

British Instrument Industry Luncheon

At the annual luncheon of BIMCAM (British Industrial Measuring and Control Apparatus Manufacturers' Association) in London on 19 January it was stated that since 1944 the industry's annual turnover had grown from £3 million to £35 million.

The BIMCAM members and their guests heard C. R. King, C.B.E., Comp.I.E.E., M.Inst.S., chairman of the Electricity Council, describe how in his 40 years' experience of the electricity industry he had watched instrumentation assume an even more important role. He recalled that in 1927 the ratio of manpower to output was 2·8 per thousand kW and now, by the adoption of modern instrumentation, that figure had been reduced to 0·4 per thousand, and praised the outstanding achievement of the BIMCAM member firms in providing the equipment required.

At the 1960 *BIMCAM Annual Luncheon.* From left to right, *A. W. Berry (director, British Engineers Association), Dr F. M. H. Taylor (vice-president, Institution of Heating and Ventilating Engineers), V. A. Kamensky (chief trade representative of U.S.S.R. in the U.K.), V. D. MacLachlan (chairman, BIMCAM), C. R. King, C.B.E., Comp.I.E.E., M.Inst.S. (chairman, Electricity Council), W. G. Thomas (president, BIMCAM)*

V. D. MacLachlan, chairman of BIMCAM, in his reply gave the industry's turnover figures mentioned above, and added that it was satisfactory to note that the export percentage of the total was much higher than the national average. He therefore advocated a strengthening and enlargement of BIMCAM itself, a freer exchange of information and ideas between members, and the establishment of closer relations with the associations of other appropriate industries.

The toast of the guests was proposed by BIMCAM's president, W. G. Thomas. He expressed the regret of all present at the absence through illness of W. G. Ardley, the founder of the association, and expressed his particular pleasure at having with them V. A. Kamensky, chief trade representative of the U.S.S.R. in the United Kingdom. He then introduced S. W. J. Wallis, M.Inst.Pet., of The British Petroleum Co. Ltd, who replied on behalf of the guests. As a considerable user of control systems, Mr Wallis hoped that the members of BIMCAM would appreciate the need for very close collaboration between the makers and users of instrumentation. His experience was that plants were increasingly being built with integrated control systems, and mentioned that in the last year alone he had been concerned with no less than five such computer-controlled integrated systems.

New Theories on the Production of Heavy Water

In a paper presented to the 1959 Annual Meeting of the American Institute of Chemical Engineers, at San Francisco, two Esso Research and Engineering scientists discussed four possible new approaches for the production of "heavy water". These were said to be ammonia distillation; "reasonant" electrolysis of water, liberating deuterium directly; hydrogen-water-hydrazine dual-temperature exchange; and concentration by charcoal absorption.

It was said that the value of any of these new proposals depended on laboratory confirmation of optimistic assumption, but all had some justification on data already available.

Heavy water was first produced on a large scale during the second world war by electrolysis in Norway, and in a chemical exchange plant in British Columbia. Water distillation has also been used on a large scale. After the war, however, these processes were largely replaced by the hydrogen sulphide dual-temperature process now used by the AEC in the United States at its Savannah River plant. This plant manufactures heavy water at a cost of about £10 a lb, including allowance for depreciation. This was the cost that any new process had to beat.

Heavy water contains heavy hydrogen (deuterium) instead of ordinary light hydrogen, but it has the same chemical properties as ordinary water. It occurs naturally in ordinary water in a concentration of about 1 part in 7000. Recovery of this small amount on a commercial scale represents a chemical engineering achievement of no mean proportions. Deuterium is important as an efficient and selective moderator for certain types of nuclear reactors. It is also the "cheap" raw material for controlled fusion and, as such, it could be a very important future energy resource for the world, should practical controlled fusion be attained or should studies on underground nuclear explosions for peaceful energy supplies develop successfully.

The Effect of Automotive Styling on Special Lubricant Requirements

In the automotive industry streamlining is the order of the day. To accomplish this effect, designers have tended to reduce the height of vehicles, and any doubts on this score can be dispelled by comparing a 1960 car or truck with a 1950 model. This trend has lowered the centre of gravity and enhanced road stability at the high speeds possible on the new motorways that are being built to accommodate to-day's traffic.

Many of the styling changes in the automotive industry, which often appear to be only concessions to popular taste, start a whole series of engineering modifications that require the talents of engineers, metallurgists, chemists, and physicists before they can be incorporated in the new car models. Research teams, for example, have to study the behaviour of the engine components that have been redesigned and re-located in order that the bonnet may be restyled. The adaptation of fuel injection to the car engine was stimulated by the need to dispense with the carburettor on advanced models that featured a low bonnet.

A further example is apparent in the bevel gear used in the back axle of all cars and trucks, and which transmit the power

from the engine to the road wheels. As the stylists reduced the height, and hence the road clearance, these gears took on a new design, known as the hypoid gear. In this design, the teeth of the gears contact at an off-set angle. As a result, the teeth are subjected to very high forces or loadings, and there is a high degree of tooth sliding which can cause excessive wear. These problems are aggravated as engine power goes up and road speeds increase.

Protection of these gears is accomplished by the gear lubricant, which prevents the gear surfaces coming together and welding under the heat developed by the combination of high sliding speed and the shocks resulting from rapid acceleration and quick stops. Thus the lowering of the silhouette of the modern car has brought about a specially-designed gear and the requirement for an extreme pressure lubricant to lubricate this gear.

Certain designs of axle are more severe in their lubrication requirements than others, particularly during the early life of the gears before they are run or broken in. At the Thornton Research Centre of "Shell" Research Ltd continuous studies are made of the hypoid gears in automotive equipment and special tests have been developed to evaluate lubricant performance. In this way, lubricants capable of meeting the latest demands of the motor industry are developed.

For example, in shock tests a fully-laden car is driven at high speed, the engine disengaged by the clutch and switched off. The clutch is then abruptly re-engaged against the static engine, imposing a heavy shock load against the gears. This procedure is repeated a number of times in each gear. To assess the performance of oils under high-load and low-speed conditions, as experienced in trucks or cars towing caravans, Thornton uses a hypoid gear ring. This simulates conditions representing a steady drive, fully laden, up a severe incline for some 300 miles non-stop. Thornton's chassis dynamometer permits simulation of high-speed operation to evaluate gear oil performance during "running-in" life of new gears.

Tests are also carried out on the test-track at the Motor Industries Research Proving Ground, Nuneaton. Here commercial type vehicles, again fully laden, tow the MIRA road dynamometer round the circuit, simulating a steady drive up severe inclines.

By using these and other tests, oils have been developed to satisfy the most exacting axles during the critical run-in-period. Experience gained during this work materially assists the development of gear lubricants to meet the requirements of future designs and operating conditions of hypoid geared axles.

Insecticide Experiments on Locusts

Experiments with anti-locust insecticides are being studied at The British Petroleum Company's Research Centre, Sunbury-on-Thames, where some 3000 locusts in various stages of adult development are kept in special cages with a temperature and humidity as close as possible to the natural conditions in which the insects normally live. They are bred from an original batch of 25 males and 25 females provided by the Anti-Locust Research Centre in London. In about a fortnight, these had produced over 300 offspring.

For some years, British Petroleum have supplied solvent oils, for use as a base for insecticides needed in the war against locusts in Africa and the Middle East. New refinery processes have made available a number of new solvent oils. Experiments at Sunbury have shown that some of these new solvents will dissolve much larger quantities of anti-locust insecticides than those derived from ordinary kerosine refining. The problem is not only one of how much insecticide can be dissolved but also one of the skin-penetrating powers of the solvent and of the solvent combined with the insecticide. The research now in progress is designed to discover which of the new solvent oils will carry the poison they contain most quickly and effectively through the skin of the locust, and so produce the best insecticide.

A fledgling locust just after the fifth and final skin shedding. The wings are beginning to expand.

The experiments are made individually on adult locusts 3–4 weeks old in batches of 50. This prevents the variation of results which would be caused by using insects of different ages. Equal numbers of male and female insects are used so that differences in the reaction of each sex may be noted. So far, little difference has been observed, whereas similar work with houseflies has proved that the female fly has more resistance than the male.

The oil solution of the insecticide is applied in the form of a tiny drop from a micro syringe onto the insect's stomach under a powerful magnifying glass. Each locust is weighed before being dosed so that each one in a batch of 50 receives the same amount of insecticide per unit of body weight. As soon as the insecticide has been dropped upon it, the locust is placed in a cage stocked with food, together with others treated with the same amount of insecticide. Observation is kept to see how long it takes the insects to lose their ability to move about and feed. The number of deaths in a cage are recorded each day until all are dead or the number is static. From such observations and by using the standard anti-locust insecticides now in use for comparison, it will be possible to find which of the new solvents will produce the best and most powerful insect killer.

Other aspects of this work include the supply of kerosine extracts and other solvents to the Anti-Locust Research Centre at Porton, on Salisbury Plain, for testing in aircraft spray experiments. Work is also done on the preparation and testing of known amounts of insecticides to attack locusts in the hopper stage. Resin-forming hydrocarbons are used to produce sticky substances of the consistency of linseed oil. These are applied to the leaves eaten by the hoppers which are then killed by feeding instead of by skin penetration.

Oil Storage at Dagenham

A Samuel Williams Enterprise

An interesting post-war development in public oil storage facilities on the River Thames within 12 miles of London Bridge is the Dagenham Dock installation of Samuel Williams & Sons Ltd, part of the Williams Hudson Group. Here there is a capacity for the storage of 75,000 tons of petroleum products or chemicals in tanks varying from 400 tons to 8000 tons in individual capacity.

The main petroleum products stored at Dagenham are fuel oil, gas oil, and derv. These petroleum products are stored on behalf of Gulf Oil (Great Britain) Ltd, and are distributed by John Hudson & Company Ltd, an associated company in the Williams Hudson Group.

The chemicals at present handled include glycol, butanol, styrene, and furfural. There would, however, appear to be little limit to the varieties which might be stored. The policy of the Company is to cater for any specialized service and to provide accommodation for manufacturing and blending facilities.

Jetty Facilities

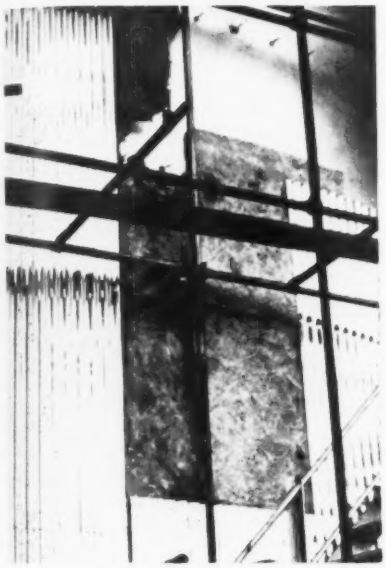
The tanker jetty is suitable for vessels up to 32,000 tons dead-weight, the depth of water being 34 feet at low water. The jetty head is of conventional construction with one dolphin at each end for mooring purposes. An interesting appliance on the jetty for handling pumps and hoses is a 8½-ton Scotch derrick which is fully flameproofed.

For the discharge of fuel oil a 16-inch pipeline is available leading direct to three 8000-ton fuel oil tanks on the far side of the installation. Discharging rates of over 1000 tons per hour of fuel oil can be achieved.

An aerial view of the Dagenham Dock oil storage installation with a 15,000-ton tanker at the jetty

A special feature of the 16-inch fuel oil line is a stripping arrangement to remove completely all oil from the line. When pumping ceases and all valves are closed, any oil in the line is forced into the low-level sections and is pumped out through a small diameter by-pass line to leave the main line completely empty. Thus, there is no fear of heavy fuel oil blocking the line and the need for lagging around the pipeline is avoided.

Numerous 6-inch and 8-inch pipelines are available for the unloading of lighter petroleum products. Special lines are available for chemicals to avoid any risk of contamination and



Tank insulation in progress. The studs welded to the shell can be seen (top right) *as well as the fibreglass and aluminium sheeting*
Photo by George Sell

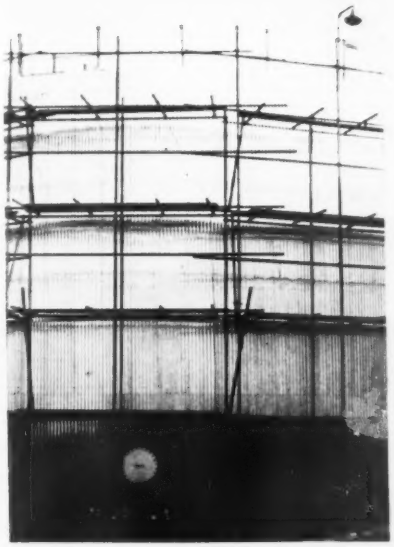


Photo by George Sell
Insulation nearing completion

flameproof mobile pumps are provided for handling chemicals.

Barges loading or unloading petroleum spirit are accommodated at a special berth on the inner side of the jetty. Some chemical products in small craft are also dealt with on the inner side of the jetty.

Oil and Chemical Distribution

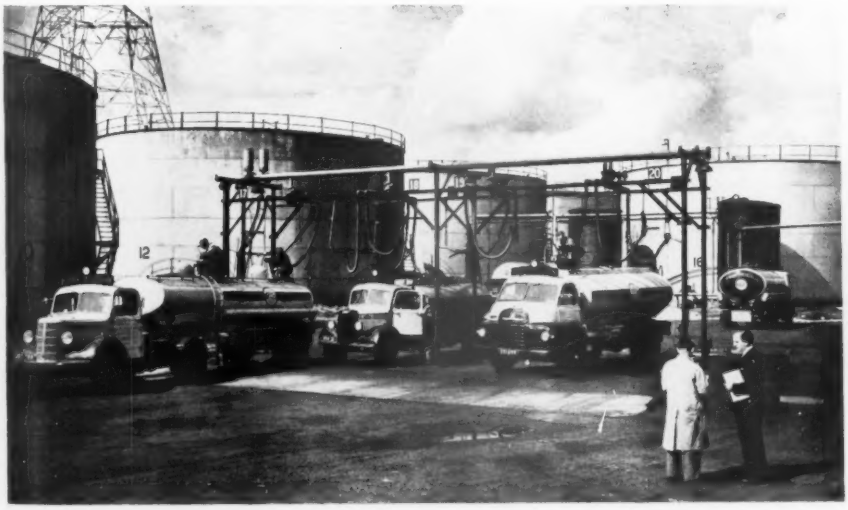
The site has direct access to the main London-Tilbury road and is within a few miles of Eastern Avenue. There is also a direct rail connexion between the main London-Tilbury line of British Railways and Samuel Williams' internal railway system which includes 25 miles of track within the site boundaries. For the movement of tank wagons and other railway trucks, diesel locomotives are used. These have an unusual feature in that they are in radio-telephone communication with the central control room. Thus, any changes in movement of wagons can quickly be carried out.

Adequate loading facilities are available for the loading of road and rail tank vehicles. Separate loading bays are provided for different grades of liquid. Thus, there is a bay for heavy fuel oil, one for light fuel oil and gas oil, and another for chemicals. Each bay is equipped to handle numerous vehicles simultaneously and special care is taken to avoid any possibility of contamination.

Blending Plant

To supplement the normal grades of fuel oil, a blending plant is available which will produce fuel oils of any intermediate viscosity which may be required. This blending plant was designed by the Company to give accurate in-line blending at the rate of 200 tons per hour.

A small but adequately equipped laboratory on the site provides facilities for the testing of oils and chemicals. It is particularly valuable for rapid testing of chemical cargoes before they are discharged from tankers into storage.



Tank Insulation

Recently the Company, in conjunction with Gulf Oil (Great Britain) Ltd, has been giving particular attention to the insulation of tanks which are used for the storage of heavy fuel oil. This insulation provides an economical means of conserving heat in the oil and reduces the consumption of steam for heating oil prior to delivery.

Several tanks, including three 8000-ton tanks, are being insulated with fibreglass by an interesting and new procedure. First, a series of studs are welded

Adequate facilities are provided for the loading of road and rail tank cars. A group of John Hudson vehicles loading fuel oil

Special facilities for the storage of chemicals and light petroleum products

Photo by George Sell

on to the tank shell at predetermined points, and it should be noted that with heavy fuel oil tanks this can be done without emptying the tank. Slabs of fibreglass are then placed in position and held there by corrugated aluminium sheets. The latter are held securely in place by closures pressed on the studs which protrude through the sheets. The final appearance, as can be judged by the accompanying photographs, is pleasing and no painting is required.

Other Operations

The oil and chemical storage installation forms only part of Samuel Williams activities at Dagenham Dock. The site has a total area of some 400 acres with a river frontage of ¾ of a mile. Wharves and jetties along this river frontage cater for loading and discharging dry cargo vessels up to 12,000 tons deadweight. A great variety of cargoes are handled, including motor vehicles, steel, cardboard, raw sugar, and coal.

Part of the site has been developed as an industrial estate for a variety of industries whose raw materials arrive by ship. On this industrial estate, Regent Oil Company have a lubricating oil blending and packaging installation and Distillers Company Ltd have a plant producing solvents.

Acknowledgment

The Editor wishes to thank those members of the Company's staff who provided the information on which this article is based and willingly gave of their time during his visit to Dagenham.

Photo by George Sell

F. H. Sanderson (oil storage superintendent) *and R. L. Murphy* (commercial manager) *among the tanks at Dagenham*

* * *

NEW ANTI-KNOCK ADDITIVE DEVELOPED IN MOBIL LABORATORIES

It was announced recently that scientists of Socony Mobil Oil Company Inc. have discovered a new principle for manufacturing gasoline that may play a critical role in meeting the fuel requirements of new cars.

The research effort that led to the discovery was prompted by a stubborn knock in the cylinders of certain automobiles made outside the United States, using some of to-day's gasolines. The octane number of the gasoline used was high enough, the researchers found, to satisfy the supposed anti-knock requirements of the cars. Still the cars knocked. Later the knock appeared in the engines of some cars made in the United States.

The researchers tested the engines of the cars with an electronic analyser developed by the oil company several years ago. The analyser enabled them to check each cylinder independently while the engine was in operation. It was found that some, but not all, of the cylinders were knocking, the reason being that some cylinders were getting a better anti-knock fuel mixture than others.

The scientists cured the new knock by using anti-knock additives that travelled in the engine with the portions of the gasoline needing an octane boost. The additives had the same vaporizing characteristics as the gasoline component with the lower octane performance. This meant power was added where power was needed.

The experiments showed that one additive, tetramethyl lead, is very effective in an important type of present-day gasoline. Tetramethyl lead was tested in the gasolines of a number of years ago, but at that time did not prove worth exploiting commercially.

It has been found that tetramethyl lead boosts the octane number of certain types of gasoline components even more than tetraethyl lead.

* * *

MIDDLE EAST OIL PRODUCTION

	January
	Tons
Iraq Petroleum Co. Ltd	2,587,999
Basrah Petroleum Co. Ltd	992,840
Mosul Petroleum Co. Ltd	104,346
Qatar Petroleum Co. Ltd	719,441
Iraanse Aardolie Exploratie en Productie Mij	4,085,000
Kuwait Oil Co. Ltd	6,641,761
	Barrels
Arabian American Oil Co.	37,856,479
Bahrain Petroleum Co. Ltd	1,397,017
Getty Oil Co. (Kuwait-Saudi Arabia Neutral Zone)	3,918,596

The refinery throughput at Abadan of the Iraanse Aardolie Raffinage Mij for January was 1,349,000 tons.

Crude processed at Aramco's Ras Tanura refinery during January was 6,162,075 brl.

On 19 January Dukhan field, Qatar, produced its 50-millionth ton of crude oil since December 1949, when production in Qatar first began.

Abstracted on Crude Production in International Trade, 1958
(Thousands of Barrels)

MOVEMENT OF CRUDE PETROLEUM IN INTERNATIONAL TRADE, 1958[1]*

(Thousands of Barrels)

MAJOR EXPORTING COUNTRIES	Canada	United States	Colombia	Venezuela	Other W. Hemis.	Total W. Hemis.	Austria	Iran	Iraq	Kuwait	Neutral Zone	Qatar	Saudi Arabia	Egypt	British Borneo	Indonesia	Soviet Bloc (incl. USSR)	Other E. Hemis.	Total E. Hemis.	Total
IMPORTED BY:																				
NORTH AMERICA																				
Canada		1,153		72,365	1,939	75,517		134	244	6,544			12,657					10,763	30,342	105,859
United States (incl. Alaska)	30,621		9,770	170,309	1,826	212,526		5,829	8,411	73,714	7,323	1,538	27,159			23,845		684	148,503	361,029
Sub Total	30,621	1,153	9,770	242,674	3,825	288,043		5,963	8,655	80,258	7,323	1,538	39,816			23,845		11,447	178,845	466,888
CARIBBEAN																				
Cuba		592	123	25,164		25,879														25,879
Puerto Rico				22,957		22,957														122,957
Sub Total		592	123	48,121		48,836														48,836
SOUTH AMERICA																				
Argentina				27,676	2,546	30,222				13,571							4,885		18,456	48,678
Brazil				25,783	655	26,438				9,503			5,991						15,494	41,932
Chile				2,503		2,503														2,503
Netherlands Antilles			10,091	223,749	6,747	240,587														240,587
Trinidad			1,641	17,911		19,552							6,082						6,082	25,634
Uruguay				7,014	249	7,263											827		827	8,090
Sub Total			11,732	304,636	10,197	326,565				23,074			12,073				5,712		40,859	367,424
WESTERN EUROPE																				
Belgium and Luxembourg				3,975		3,975		20,289	3,046	10,686			10,003						44,024	47,999
Finland				126		126		3,060									3,300		6,360	6,486
France		471		15,131		15,602		10,962	64,045	56,771	2,782	23,652	27,769				1,315	6,030	193,326	208,928
Germany, West				15,090		15,090		9,299	22,727	13,391			18,128			19			63,564	78,654
Gibraltar (for Eur. ports)										3,357									3,357	3,357
Greece													1,427						1,427	1,427
Italy				4,806		4,806		4,048	35,276	50,676	2,626	10,163	42,350	7,611	604	441	7,452		161,247	166,053
Netherlands			1,286	13,982		15,268		11,709	12,686	40,234	975		13,472		1,559	146		6,002	86,783	102,051
Portugal				107		107		842	7,116				113				359		8,430	8,537
Spain								6,481	8,563				14,873						29,917	29,917
Sweden				2,845		2,845		3,979		1,811	3,630		3,821						13,241	16,086
United Kingdom		378	1,221	30,435	800	32,834		38,021	40,553	113,827		5,280	4,972		1,346			1,722	205,721	238,555
Yugoslavia									1,298					69			3,271		4,638	4,638
Sub Total		849	2,507	86,497	800	90,653		108,690	195,310	290,753	10,013	39,095	136,928	7,680	3,509	606	15,697	13,754	822,035	912,683
MIDDLE EAST																				
Aden								3,098	15,754	6,811		2,237							27,990	27,990
Bahrain								6,635					48,740						55,375	55,375
Israel				660		660		8,340											8,340	9,000
Lebanon									2,317				3,546						5,863	5,863
Sub Total				660		660		18,073	18,071	6,811		2,327	52,286						97,568	98,228
AFRICA																				
Canary Islands				7,079		7,079			1,175			2,964	7,600					1,543	13,282	20,361
Egypt													1,263				9,659		10,922	10,922
Morocco																	218	329	547	547
Union of South Africa								9,187											9,187	9,187
Sub Total				7,079		7,079		9,187	1,175			2,964	8,863				9,877	1,872	33,938	41,017
SOUTH ASIA, FAR EAST, AND OCEANIA																				
Australia				190		190		19,400		7,324		14,790	5,475		8,151	14,431		2,068	72,639	71,829
India								10,000		8,445			13,472			2,492			34,409	34,409
Indonesia									15,259	589									15,848	15,848
Japan		1,623		94	132	1,849		6,394	11,390	27,166	4,004	2,038	36,678		7,703	5,881	82	692	102,028	103,877
Philippines																8,546			8,546	8,546
Taiwan									1,277	2,500		400	1,478						5,655	5,655
Sub Total		1,623		284	132	2,039		35,794	27,926	46,024	4,004	17,228	57,103		15,854	31,350	82	2,760	238,125	240,164
Soviet Bloc (incl. mainland China)							6,926										35,151		42,077	42,077
Other[2]				654	1,091	1,745		878		18,473	3,910		113		4,200				27,574	29,319
TOTAL	30,621	4,217	24,132	690,605	16,045	765,620	6,926	178,585	251,137	465,393	25,250	63,152	307,182	7,680	23,563	55,801	66,519	29,833	1,481,021	2,246,641

[1] Figures in this table are the result of reconciliation of reported export and import data. [2] Exports to non-designated countries. Source: U.S. Bureau of Mines.

* Reproduced from *International Petroleum Trade*, 1959, **28**, 99.

Books and Films

The Gas Industry in the Next Seven Years

Gas Looks Ahead, a booklet published by the Gas Council, gives details of the plans proposed by the gas industry in Britain for the period to 31 March 1966. It also explains the progress made by the industry since 1 May 1949.

The largest oil gasification project at present is that at the Isle of Grain, where, as mentioned in the last *Gas Council Report*, further stages of installation will raise the capacity to 62 million cu ft day from its present first-stage capacity of 20 million cu ft day.

During the seven years ending 31 March 1966, total gas-making capacity of the different types of oil gas plants planned to be installed by area boards will be 210 million cu ft day, bringing the total daily capacity of such plants at the end of that period to an expected figure of 340 million cu ft.

A single large installation planned by the North Thames Board will have a daily capacity of 40 million cu ft. This plant will be used for processing refinery gas, imported liquefied methane, propane, butane, or light distillate.

These figures of plant capacities include those for plants installed to reform refinery tail gases which can also be used to gasify oil.

The industry estimates that the sales of gas will have increased from 2605 million therms in 1958–9 to 2839 million in 1965–6. The largest increase forecast is in sales to industrial consumers, where the rate of expansion of 30 per cent in sales over the past ten years is expected to continue for the period under review.

The total of gas made, 2309 million therms, is expected to remain constant up to 1965–6. Within this total, however, the quantity of coal gas and water gas to be made will decrease, while oil gas is expected to increase by a similar quantity. By the end of this period the total of gas bought (including coke oven gas, gas reformed from oil, refinery gases, methane, etc.) is expected to rise to 776 million therms from the 1958–9 figure of 530 million, making the total available in 1965–6, 3084 million therms.

European Chemical Engineering Congress Papers

Volume 35 of the Dechema Monographs, published by DECHEMA, Dechema-Haus, Frankfurt (Main), Rheingau-Allee 25, contains 28 papers presented during the European Congress of Chemical Engineering and the ACHEMA Congress 1958.

Papers deal with the automation of processes as well as discussing the practical problems of regulation and control, and the general aspects of instrumentation.

Abstracts of the papers in English and French, and a subject index, are included in this volume, which costs DM39.40 (DM31.50 to members of DECHEMA).

Australian Petroleum Statistics

Oil and Australia—The Figures Behind the Facts is the title of an extremely informative statistical booklet published by the Petroleum Information Bureau (Australia), which presents in a handy form the salient statistics on Australian, and to a lesser degree world, oil.

Tables of gallonage figures are given for the country's consumption and refinery production of each petroleum product for 1947–1958; products demand by states in 1958 and January–June 1959; crude oil refining capacities (tons and bd); and figures for petroleum crude and products imports 1945–59, with a breakdown of crude imports by countries of origin for 1959. Further statistics are supplied concerning demand for primary energy, petroleum exports, the index of certain commodity prices, the oil industry's capital investment and operating expenditures in Australia, customs and excise duties on petroleum products, and census figures for the various forms of motor transport.

Copies of the booklet may be obtained from the Bureau, at 174 Swanston Street, Melbourne, Australia.

1959 Book of the Year

The 1959 edition of Shell-Mex and B.P. Ltd's *Book of the Year*, it is said, is primarily a tribute to the staff of the Company and to the men and women in all the industries of Britain who made the story possible.

The year's activities of the Company, which reached record heights, are highlighted, and certain specialized aspects of its work are featured in items on bitumen for roads, the planning of the new Falmouth depot, and Shell-Mex and B.P.'s training of salesmen at the Node.

The other industries featured whose existence is a mutual requisite with the oil company are those of motors, man-made fibres, and bakeries. Each is described in a light and easy manner, whilst the booklet as a whole is generously illustrated, in an entertaining fashion. Once again, however, the keynote of the publication is the emphasis on the people whose skills go to make up these varied industries.

"The Inside Story"

A new Shell-Mex and B.P. film in Eastmancolor depicts the story of five years research and development connected with the introduction of Shell *Rotella* multigrade oil. As the result of research a polymer was found which would give the *Rotella* road transport vehicle lubricants multigrade characteristics in the 10W/30 SAE range. The film runs for 34 minutes and is available on free loan in 35 mm and 16 mm gauges from Shell-Mex and B.P. Ltd, Shell-Mex House, Strand, London, W.C.2.

Opportunities for Qualified Men

The scope of career opportunities for qualified—particularly technically qualified—men has probably never been greater than it is to-day. It is to provide such people with a clear and extensive picture of the openings available to them in the many companies throughout industry and commerce that the *Directory of Opportunities for Qualified Men*, 1960 edition, has been published.

The recruitment requirements of nearly 100 companies are presented, with details of each company: its size and scope, training methods, and locations of employment. An editorial section gives a broad picture of the general employment situation and forecasts the future of various industries in the U.K. and overseas, whilst an extensive list of full-time executive courses available during 1960 is also provided.

The Directory, which is available free of charge to newly-qualified men and women through professional institutes, technical colleges, etc. is published in London by the Cornmarket Press Ltd, price 8*s* 6*d*.

Grangemouth Industrial Development

Grangemouth is the first Scottish town to have had a town development scheme approved under the Housing and Town Development (Scotland) Act, 1957, with an inter-related overspill agreement with Glasgow Corporation. The town is most anxious to attract industry to this already growing area, for it has a target population of 30,000 which it is hoped to achieve as quickly as possible. To this end the town council have published a booklet entitled *Grangemouth—Scotland's Industrial Magnet* which is intended to bring to the attention of any industrialist considering a development in Scotland the favourable facilities which Grangemouth has to offer. Maps, plans, and statistics of communications, sites, services, and community facilities give basic information which can be supplemented on application to the Town Clerk of Grangemouth.

British Standard

Bomb calorimeter thermometers

In this revised publication (BS 791 : 1959) requirements for the 12°C range thermometers specified in the 1954 edition have been excluded, and only the more accurate 6°C range thermometers for use with bomb calorimeters have been retained.

Among the requirements specified are those for material dimensions, construction, graduation, and figuring.

An appendix lists the manufacturers and identification marks of glasses approved by the National Physical Laboratory.

Copies may be obtained from the BSI, Sales Branch, 2 Park Street, London, W.1, price 4*s* (postage extra to non-subscribers).

OCMA Specifications for Electric Motors

The Oil Companies Materials Association Specification No. ELEC 1, *Standard Three-Phase Squirrel Cage Electric Motors*, originally published in November 1953, has now been revised by the OCMA Electrical Panel.

It is said that large numbers of electric motors, both industrial and explosion-proof, are used in the oil industry, but the requirements of users often differ in detail. Nevertheless their fundamental requirements are similar and therefore the OCMA have issued this specification which represents their agreed basic requirements for electric motors.

The revision has been made with particular reference to the items concerning insulation; starting conditions; types of enclosures; and terminals, terminal boxes, and cable entries. A schedule giving headings for information to be supplied by the manufacturer with a tender has been added as an appendix.

Copies are obtainable from the OCMA, Cecil Chambers, 86 Strand, London, W.C.2.

THE BRANCH LECTURE

The Branch Lecturer for the current period is H. Hyams, a vice-president of the Institute, who is well-known for his work in the field of international standardization relating to quality and quantity measurement of crude oil and petroleum products.

The title of his talk is "Why International Measurement?"

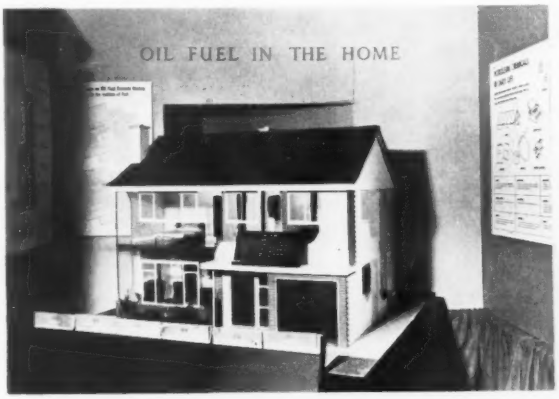
In this talk he does not propose to discuss details of laboratory test methods or equipment and procedures used in the measurement of bulk oil quantities. His aim is to convey the need for international uniformity so that in the oil industry the buyer and seller are talking the same language.

* * *

PARLIAMENTARY AND SCIENTIFIC COMMITTEE

The Parliamentary and Scientific Committee, in collaboration with The Royal Society, were hosts to a distinguished gathering of guests at a Conversazione held at Burlington House on the evening of 9 December 1959. A series of interesting and attractive displays had been arranged by the member bodies of the Committee which gave the visitors many glimpses into the discoveries that have been made in recent years into such subjects as the treatment of fabrics, de-hydration and preservation of food, measurement of fatigue, numerous applications of electronic techniques, comfort and health in the home, water treatment and distribution. Many of the displays were arranged in a most novel and entertaining manner—the coin which "jumped to it" when shouted at, the self-steering vehicle which followed a white line, the machine which measured the speed of one's reactions (but also indicated if one was cheating!), and an impressive demonstration of colour television where one could watch both the transmitting and receiving ends of the process. This added new meaning to the overworked adjective "colourful" when such personalities as Lord Hailsham were interviewed by newly-fledged legislators like Chris Chataway and Geoffrey Johnson-Smith.

The Institute was one of five bodies collaborating in a fuel exhibit under the general title of Comfort and Health in the Home. This exhibit was organized and co-ordinated by the Institute of Fuel, and included contributions from four other bodies in addition to the Institute of Petroleum. These were The Electrical Research Association, The British Coal Utilization Research Association, The Institution of Heating and Ventilating Engineers, and The Institution of Gas Engineers. All these exhibits were concerned with heating, mostly of homes, and that provided by the Institute to illustrate the use of fuel oil took the form of a model of a house with a centrally-disposed air heating unit from which warm air was ducted to the various rooms of the house. It excited considerable interest, particularly from the ladies, and kept our representative very busy—much to the detriment, so he tells us, of his intake of refreshments and opportunities of seeing other exhibits.



World Tanker Statistics Fourth Quarter 1959

Oil tankers under construction in the world during the final quarter of 1959 totalled 270 ships of 4,870,869 gross tons, reports the recently-published *Lloyd's Register Shipbuilding Returns* for that period. This was a decline of 348,794 tons compared with the previous quarter, and represented 50.8 per cent of the total tonnage of merchant shipping under construction in the world.

The number of steamships under construction totalled 132 of 3,427,178 tons whilst the 138 motorships had a tonnage of 1,443,691.

In Britain, 60 ships of 986,796 gross tons were being built at the end of the year, being 38,094 tons less than in the last quarter, and representing 48·5 per cent of the total tonnage under construction in the country.

Britain maintained her position as the leading country of tanker registrations, with 60 ships of 1,000,816 gross tons. Second place was once again taken by Liberia with 23 vessels of 662,078 tons; third was Norway with 36 of 547,860 tons. With the U.S.A. in fourth position with 13 tankers of 372,031 tons, the position of the leading countries was once again unchanged. Full details can be seen in Table I.

TABLE I
REGISTRATION OF OIL TANKERS UNDER CONSTRUCTION
AT END DECEMBER 1959

Country of registration	*No.*	*Gross tonnage*	*Country of build*	*No.*	*Gross tonnage*
Britain ...	60	1,000,816	Britain	51	820,296
			Belgium ...	1	13,000
			W. Germany ...	2	22,320
			Italy	4	93,800
			Japan	1	30,000
			Netherlands ...	1	21,400
Canada ...	1	26,900	Commonwealth	1	26,900
Other Commonwealth	3	105,700	Britain... ...	1	18,200
			Japan	1	57,500
			Sweden ...	1	30,000
Argentina ...	3	4,600	Unspecified ...	3	4,600
Belgium ...	2	58,150	W. Germany ...	1	31,700
			Sweden ...	1	26,450
Brazil ...	5	79,139	Denmark ...	2	14,400
			Japan	2	43,600
			Netherlands ...	1	21,139
Denmark ...	8	138,200	Belgium ...	1	13,000
			Denmark ...	6	112,500
			Japan	1	12,700
Egypt (U.A.R.)	2	27,000	W. Germany ...	2	27,000
Finland ...	2	14,600	Finland ...	1	2,600
			Netherlands ...	1	12,000
France ...	12	291,707	Denmark ...	1	21,500
			France... ...	11	270,207
W. Germany	6	80,654	W. Germany ...	6	80,654
Greece ...	3	50,780	Belgium ...	1	18,180
			Netherlands ...	2	32,600
Iran	1	21,000	France... ...	1	21,000
Israel ...	1	13,200	W. Germany ...	1	13,200
Italy	17	313,270	Italy	17	313,270
Japan ...	15	107,610	Japan	15	170,610
Liberia ...	23	662,078	France... ...	1	45,000
			W. Germany ...	3	91,663
			Japan	10	306,190
			Netherlands ...	1	13,000
			Sweden ...	4	116,405
			U.S.A.... ...	2	56,052
			Yugoslavia ...	1	13,268
			Unspecified ...	1	20,500
Netherlands ...	17	312,100	Belgium ...	1	30,000
			Netherlands ...	16	282,100
Norway ...	36	574,860	Britain	6	104,300
			Denmark ...	1	12,200
			W. Germany ...	3	74,300
			Netherlands ...	1	500
			Norway ...	15	220,120
			Sweden ...	10	163,440
Panama ...	7	147,760	Italy	3	54,760
			Japan	2	54,150
			Sweden ...	2	38,850
Poland ...	2	26,100	Poland ...	1	12,600
			Yugoslavia ...	1	13,500
Portugal ...	2	40,700	Japan	1	24,700
			Unspecified ...	1	16,000
Russia (U.S.S.R.) ..	2	6,660	Finland ...	2	6,660
Spain ...	11	134,105	Spain	11	134,105
Sweden ...	6	107,280	Sweden ...	6	107,280
U.S.A. ...	13	372,031	Denmark ...	1	29,800
			W. Germany ...	1	24,100
			Sweden ...	1	26,625
			U.S.A.... ...	10	291,506
Venezuela ...	4	90,000	Britain	2	44,000
			Japan	2	46,000
Yugoslavia ...	3	31,000	Yugoslavia ...	3	31,000
Unspecified ...	3	32,869	W. Germany ...	1	299
			Yugoslavia ...	1	16,300
			Unspecified ...	1	16,270

Of the 270 oil tankers under construction totalling 4,870,869 gross tons, 174 of 2,833,348 are for registration in country of build.

Japan was again in second place to Britain in the table of countries with tankers under construction, with 35 ships of 682,450 tons compared with the latter's 60 vessels of 986,796 tons. Italy regained the third position in this table, whilst tanker construction in West Germany kept its level better than in most of the other leading nations. Table II gives details of tankers under construction, their country of build, and type of propelling machinery.

During the fourth quarter of 1959 Britain commenced 12 tankers, launched 14, and completed 16. Japan commenced 35, launched 38, and completed 42. West Germany commenced 7, launched 13, and completed 15. Sweden commenced 6, launched 10, and completed 10. Details of launchings appear in Table III.

TABLE II

OIL TANKERS UNDER CONSTRUCTION AT END DECEMBER 1959

Country of build	*Steam*		*Motor*		*Total*	
	No.	*Tons gross*	*No.*	*Tons gross*	*No.*	*Tons gross*
Great Britain & Northern Ireland ...	27	688,210	33	298,586	60	986,796
Other Commonwealth Countries ...	1	26,900	—	—	1	26,900
Argentina ...	—	—	3	4,600	3	4,600
Belgium ...	2	48,180	2	26,000	4	74,180
Denmark ...	3	78,800	8	111,600	11	190,400
Finland ...	—	—	3	9,260	3	9,260
Formosa ...	1	20,500	—	—	1	20,500
France ...	8	245,370	5	90,837	13	336,207
W. Germany	13	322,291	7	42,945	20	365,236
Greece ...	—	—	1	16,270	1	16,270
Italy	19	458,660	5	3,170	24	461,830
Japan ...	20	591,040	15	91,410	35	682,450
Netherlands ...	12	254,039	11	128,700	23	382,739
Norway ...	2	34,500	13	185,620	15	220,120
Poland ...	—	—	1	12,600	1	12,600
Portugal ...	—	—	1	16,000	1	16,000
Spain ...	2	42,000	9	92,105	11	134,105
Sweden ...	8	236,530	17	272,520	25	509,050
U.S.A. ...	12	347,558	—	—	12	347,558
Yugoslavia ...	2	32,600	4	41,468	6	74,068
World total	132	3,427,178	138	1,443,691	270	4,870,869

TABLE III

OIL TANKERS LAUNCHED DURING THE FOURTH QUARTER 1959

Country of build	*Steam*		*Motor*		*Total*	
	No.	*Tons gross*	*No.*	*Tons gross*	*No.*	*Tons gross*
Great Britain & Northern Ireland ...	4	73,161	10	70,264	14	143,425
Other British Commonwealth Countries ...	—	—	—	—	—	—
Argentina ...	—	—	—	—	—	—
Belgium ...	1	18,180	—	—	1	18,180
Denmark ...	1	24,500	1	12,200	2	36,700
Finland ...	—	—	—	—	—	—
Formosa ...	—	—	—	—	—	—
France ...	—	—	1	33,000	1	33,000
W. Germany	3	60,528	10	20,017	13	80,545
Italy	2	59,600	—	—	2	59,600
Japan ...	7	175,300	31	29,635	38	204,935
Netherlands ...	4	75,639	1	12,597	5	88,236
Norway ...	—	—	4	58,700	4	58,700
Spain ...	—	—	1	13,000	1	13,000
Sweden ...	3	90,265	7	122,780	10	213,045
U.S.A. ...	3	76,650	—	—	3	76,650
Yugoslavia ...	—	—	2	15,168	2	15,168
World total	28	653,823	68	387,361	96	1 041,184

* * *

Lectures, Courses, and Conferences

Oil Combustion Symposium

The University of Sheffield, Department of Extramural Studies, in co-operation with the Department of Fuel Technology and Chemical Engineering, is holding a residential course on oil combustion on 10–16 July 1960.

Topics to be covered by lectures or practical demonstrations include types of oil flames; combustion characteristics of different hydrocarbons; combustion aerodynamics; incomplete combustion; flame heat transfer by radiation and convection; gas turbine combustion; atomization demonstrations; and soot formation.

Total fee for the course is £13 (£21 for those who stay in accommodation arranged by the University). Applications to join the course, accompanied by a registration fee of £1, should be made to The Director, Department of Extramural Studies, St. John's, Crookes Valley Road, Sheffield 10.

"The Training of the Industrial Physicist"

The Education Group and Midland Branch of The Institute of Physics will be holding a joint conference on "The Training of the Industrial Physicist" on 21–22 April 1960, in Birmingham. Papers will be presented on Problems of Selection for Diploma in Technology and University Degree; The University Degree and Diploma in Technology Compared as a Training for the Industrial Physicist; Postgraduate Training in Physics; and the Requirements of Industry.

Detailed programmes and registration forms are available from the Secretary, The Institute of Physics, 47 Belgrave Square, London, S.W.1.

NIFES Oil-Firing Course

The next NIFES three-day course on oil firing for industrial plant engineers, heating engineers, and supervisory staff responsible for oil-fired boiler plants will be held on 3–5 May 1960, at Ailsa House, Kings Road, Reading.

The fee for the course, exclusive of hotel accommodation, will be 6 guineas. Application forms, and a course syllabus, may be obtained from the National Industrial Fuel Efficiency Service, 71 Grosvenor Street, London, W.1.

Hunting Survey Symposium

Present at one of the sessions were (back row left to right) *G. M. Adams (director, Hunting Surveys Ltd), P. Le Sage (Hunting Technical Services Inc (U.S.A.)), P. A. Rankin (technical manager, Hunting Surveys Ltd), W. A. Willox (manager, Geology Division, Hunting Technical Services (U.K.)),* (seated) *T. D. Weatherhead (managing director, Hunting Surveys Ltd), Dr. N. R. Paterson (chief geophysicist, Hunting Survey Corp, Canada), C. P. M. Hunting (chairman, Hunting Surveys Ltd, and president of Hunting Associates Ltd), Dr W. Domzalski (chief geophysicist, Hunting Surveys Ltd), D. N. Kendall (vice-president, Hunting Associates Ltd, Canada)*

A symposium on airborne geophysics, sponsored by the Survey Division of the Hunting Group, was held at the Group's London headquarters on 25–28 January. Matters discussed included airborne magnetometry, electromagnetics and radioactive surveys, interpretation and survey procedures, and ground "follow up" geophysical work.

The Hunting Survey Group, and its associates, has had long experience of operating a wide range of airborne geophysical instruments which include the dual frequency fixed-wing and the Ronka helicopter electromagnetometer, the Mullard Rio Tinto fixed wing electromagnetometer, and the rotary field method of the A.B.E.M. Company.

Considerable experience has also been gained in operating both the Fluxgate and proton precession magnetometers for Governments and oil and mining companies.

Fuel Efficiency and Power for Industry Exhibition

The scope of the 1960 exhibition on this subject has been considerably increased, and will offer the industrialist and all who are engaged in the provision of heat, light, and power for industry the opportunity to examine the latest methods of producing efficient services at the lowest cost.

The Fuel Efficiency and Power for Industry Exhibition will be held at Olympia, London, 27 April to 6 May.

As an adjunct to the Exhibition a series of technical meetings under the general title of "The Selection of Fuel-Using Equipment and Power Plant" will be held in the Conference Hall at Olympia on 2 and 3 May. The organizing committee has been convened by the Institute of Fuel, and in addition to the Institute of Petroleum includes representatives of all fuel organizations and trade bodies.

The programme of meetings will be as follows:—

2 May, 2.15 p.m.

Opening of the Meetings, by Dr A. C. Monkhouse, C.B.E. (president, *The Institute of Fuel*).

Session I. **Effective Combustion in Steam Boilers.** D. C. Gunn (*Cochran & Co., Annan, Ltd*).

Session II. **Efficient Use of Electricity in Industry.** W. J. Dickie (*Federation of British Industries*).

3 May, 2.15 p.m.

Session III. **Heat Transfer.** R. F. Hayman (*The Gas Council*).

Session IV. **Heat Losses.** J. H. G. Bilney (*Shell International Petroleum Co. Ltd*).

Heat Recovery. F. H. Newman (*Senior Economisers Ltd*).

Advance copies of the papers to be presented will be available without charge at the meeting or on request beforehand (after 14 April), covered by 9*d* for postage and packing, from the Secretary, The Institute of Fuel, 18 Devonshire Street, Portland Place, London, W.1, to whom requests for tickets of admission (stating sessions required) should also be addressed, marking the envelope "Olympia" in the left hand top corner.

THE *OLYMPIC CHALLENGER* COMES TO THAMES HAVEN

An impression of the size of the 65,000-*ton* Olympic Challenger, *largest tanker yet to sail up the Thames, is given by the fact that three tugs were needed to guide it to its jetty at London & Thames Haven Oil Wharves*

Trade Literature, etc.

Further Expansion at Hythe

The International Synthetic Rubber Company Ltd have started to expand the annual capacity of their Hythe plant from 70,000 to 90,000 tons.

This follows closely upon the commencement of construction of a plant for the production of 2,500,000 gallons a year of rubber latex.

Whessoe Agent in Australia

Whessoe Ltd announce that they have appointed Austral Engineering Supplies Pty Ltd, to represent them in Australia for the sale of the Whessoe S & J tank fittings which Whessoe manufacture under licence from Shand & Jurs Co., Berkeley, California, U.S.A.

In addition Austral will cover the Telepulse system of remote indication of storage tank levels and temperatures, and the Whessoe/Fielden Servo tank gauge, which gives accurate measurement of liquid levels to ± 1/20 inch.

Split Studs for Plant Linings

A new leaflet issued by Andrew Marsden & Co , 24 Crown Lane Gardens, Crown Lane, Streatham, S.W.16, gives details of its new patent type of split studs for use in oil refineries and similar installations.

Their primary purpose is to provide supports and distancing pieces between the metal walls of vessels and the metal fabric linings.

Fire Valve

R. F. Landon & Partners Ltd, 50–52 King Street, Southall, Middlesex, gives details in a leaflet of its new Kingsway "Watchman" fire valve, suitable for either vertical or horizontal pipe runs.

"Products of the Rare Earth Group"

For some years Johnson Matthey & Co. Ltd has produced rare earth elements, and recent research into the application of ion-exchange techniques to the separation of these materials has made them available in large quantities, in various grades of purity, and at much lower cost than hitherto.

A publication, *Products of the Rare Earth Group*, just issued by the Company, describes the properties, characteristics, and availability of this potentially-valuable and very topical range of materials. It is available free on request to the Company's head office at 73–83 Hatton Garden, London, E.C.1.

PVC-Coated Nylon Fabric

The availability of high-quality tarpaulins, covers, and salvage sheets made from a low twist, high-tenacity lightweight nylon fabric coated with pvc, is announced by James North & Sons Ltd, Kirkman House, 54a Tottenham Court Road, London, W.1.

This *Northylon* material has a pvc/nylon bond of over 10 lb, which is 4 lb above the BSI minimum, and is said to have the strength of much heavier conventional materials.

Ultrasonic Cleaning Unit

Ultrasonics Ltd, Westgate, Otley, Yorkshire, will soon be marketing in Britain a low-cost, high-power, ultrasonic cleaning unit for laboratory use, the *Rapiclean* 1.

A booklet describing the *Rapiclean* is obtainable on application to the Company.

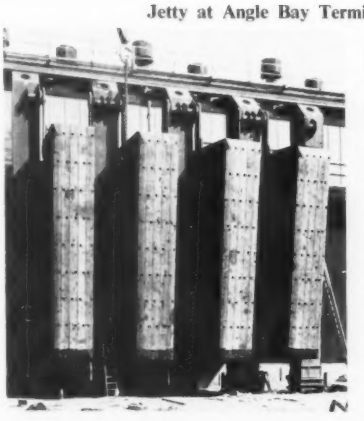
What Makes the Company Tick

A new hundred-page publication entitled *World of Meaning* seeks to convey a far-ranging impression of the scope and significance of the activities and products of S. Smith & Sons (England) Ltd, Cricklewood, London, N.W.2.

The name of Smiths is widely-known, particularly in the field of watchmaking, but the huge and immensely-varied range of other products manufactured by the Company are probably not so well-known. From instruments for the motor and aircraft industries to clocks and watches for the home, and from measuring indicators and echo sounders for marine use to film projectors, electric motors, and switches for industry, the book gives a vivid impression of the diversity of the Smith's products.

It does not indulge in detailed description or technical data but, with the aid of colour sketches, presents the Company's work now and in the future in an attractive and easily-readable style.

Jetty at Angle Bay Terminal



Weldall & Assembly Ltd, Old Wharf Road, Stourbridge, Worcestershire, has been given the £150,000 contract for the manufacture of the hanging weight fenders and retraction gears for the new jetty at BP's marine terminal at present under construction at Angle Bay, Milford Haven.

The four sets of fenders shown on the accompanying photograph will be on the two berthing points at the end of the jetty head. The fenders, which are 24 ft high × 4 ft 6 in wide × 13 ft 9 in deep, are faced with timber and are supported from the columns by trunnions. When filled with concrete they can absorb the shock of tankers up to 100,000 tons displacement.

Packaged Boilers at Fuel Oil Installation

Automatic oil-fired packaged Powermaster boilers, manufactured by G. W. B. Furnaces Ltd, (Boiler Division) of Dudley, Worcs, were installed in the recent setting-up of an industrial fuel oils depot at Woodlesford, near Leeds, by the Regent Oil Co. Ltd.

The two Model 60 Powermasters which provide the heat are each capable of generating up to 2070 lb of steam per hour at a pressure of 100 psi. The units are completely automatic and packaged, incorporating on the same base the burner, oil preheater, fuel pump, water pump, and all controls.

Pumps for 77,000-ton Tankers

Amongst contracts recently received by Hayward Tyler & Co. Ltd, a member of Stone-Platt Industries, are those for large capacity centrifugal cargo oil pumps for three 77,000-ton dw tankers to be built by A. G. "Weser" for the Esso Group.

Each vessel will be fitted with three cargo pumps, each pump having a capacity of 2250 tons sea water/hr, operating against 150 psig when driven by steam turbines rated at 1250 bhp. In addition Hayward Tyler will supply one centrifugal ballast pump of 1350 tons sea water/hr capacity for each ship.

Solenoid-Operated Pipeline Stop Valve

Simmonds Aerocessories Ltd, Treforest, Pontypridd, Glamorgan, a member of the Firth Cleveland Group, has introduced a solenoid-operated valve for the control of liquid flow in a pipeline, by the establishment or failure of the electric supply current. The valve may be used as a remotely-controlled stop valve, and is available for operation from DC or AC supplies, in both flameproof and non-flameproof versions. It is normally manufactured from high-tensile aluminium alloy, but a forged steel version can also be supplied.

Corrosion Resistance of ICI Titanium

The Metals Division of ICI has published the third in their new series of booklets on ICI wrought titanium. Entitled *Corrosion Resistance* it covers the resistance of titanium to simple chemical reagents, industrial liquors, and liquid metals.

Electronic Oilfield Production System

A new electronic supervisory control system, designed and built by Southwestern Industrial Electronics Co., a division of Dresser Industries Inc, is being installed for the Phillips Petroleum Company on a 20-well lease in one of its Lake Maracaibo, Venezuela, operations.

This provides a push-button control for remote and local well testing and production, and is applicable to virtually any remote lease—either offshore, land, or marsh.

Latex Plant for Rotterdam

A new styrene-butadiene latex plant is to be built and operated in Rotterdam, Netherlands, by Dow Chemical International Ltd's wholly-owned Dutch subsidiary, Nederlandsche Dow Mij NV, at the site of its present terminal and warehousing facilities in the Third Petroleum Harbour at Rotterdam. Investments in the new installation total over 7½ million Dutch guilders (over £700,000).

Completion of the plant is scheduled for early spring 1961, and its initial annual capacity is expected to be large enough to cover the increasing styrene-butadiene latex requirements of Western Europe. Badger NV has part of the building contract.

U.K. Refrigerator Rights

John Harper & Co. Ltd, of Willenhall, Staffordshire, has concluded an agreement with Messrs Hermann Forster, Arbon, Switzerland, giving them the sole selling right and option to manufacture in the United Kingdom their 2½ cu ft refrigerator. This refrigerator will market under the name of Harper.

New Hydrogenation Catalysts

An article of particular interest in the January 1960 edition of *Platinum Metals Review* discusses a new type of palladium hydrogenation catalyst, developed in Japan at Osaka University, with silk as its carrier material.

Copies may be obtained on request from the publishers, Johnson, Matthey & Co. Ltd, 78 Hatton Garden, London, E.C.1.

Gordon Flowmeters

James Gordon & Co. Ltd, Dalston Gardens, Stanmore, Middlesex, has published a new catalogue on the subject of the Company's flowmeters. It includes the Bristol Series 500 mechanical flowmeters for recording, indicating, integrating, and controlling, and the Elliott IIC bellows-operated differential flowmeter for use where the mercury manometer type is unsuitable.

New Glass-Reinforced Plastic Pipe Designed by Esso

Improved lower cost glass reinforced plastic pipe that may help industry reduce its huge corrosion costs was discussed recently by R. M. Levy and B. M. Vanderbilt of Esso Research and Engineering Company at the Society of Plastics Industries meeting in Chicago.

Based on an improved pipe lining and a Company-developed resin—*Buton*—the new pipe was produced in co-operation with plastic pipe manufacturers. It is said that results of laboratory and field studies show that it is able to withstand temperatures ranging from −40 C to 150 C, and that it has a long useful life. The new pipe, it is claimed, results in better flow characteristics through the pipe, has a high strength to weight ratio, low thermal and electrical conductivity, and resists corrosion and barnacle attack.

The lining, made by combining butadiene-acrylonitrile rubber and polyvinyl chloride, prevents internal abrasion and erosion of the glass reinforcing material. Resistant to oil and chemicals, the lining is vulcanized at the temperature at which the pipe is cured. The resin, which is extremely resistant to water, reacts chemically with the lining during curing and results in strong adhesion.

The new pipe is a development of a research programme started by the Company in 1957 to accelerate the design of plastic pipes for use in oilfield and pipeline operations. Operating affiliates of Standard Oil Company (New Jersey) spend an estimated $12 million annually combating corrosion in pipelines.

More that 18,000 feet of different types of plastic pipe are being field tested by Esso affiliates. Results have shown that the glass-reinforced plastic pipe can be installed on flat terrain faster by two men than a five-man crew can install the conventional steel pipe. Co-operative work with the Spiral-Glass Pipe Company, Old Bridge, New Jersey, on a new mechanical coupling promises to promote faster effective joining of pipe sections of any size.

New type plastic pipe being developed in Esso Research and Engineering Company laboratories undergoes tests demonstrating its fire-resistance. The pipe survived a 15-minute gasoline fire, both when empty and when filled with water and under pressure

W. J. Brooker Associate Formed

W. J. Brooker Ltd, 28 Westminster Bridge Road, London, S.E.1, industrial painting contractors, announces the formation of an associated company, Brook-Blast Ltd. This new company will specialize in on-site shot-blasting, metal spraying, and protective coating operations in all parts of Britain. Directors are W. J. Brooker and D. M. Legget.

Elliott Automation Extends Interests

The Elliott-Automation Group has widened the scope of its interests in control valves by the purchase for cash of Black Automatic Controls Ltd, of Corsham, Wilts, manufacturers of a wide range of control valve and pressure-regulating equipment.

Elliott-Automation has also bought the nucleonic instrumentation business of Isotope Developments Ltd, including its laboratories and works at Beenham, near Aldermaston, Berkshire. Elliotts is acquiring the name and goodwill of the Isotope Development Company, but not the business of its subsidiary, R. A. Stephen & Co. Ltd.

Rocol Lubricants Applications

Two technical information publications produced by Rocol Ltd, Rocol House, Swillington, near Leeds, give details of the uses of Rocol molybdenized lubricants in the iron and steel industry, and in coal mining and associated equipment, respectively.

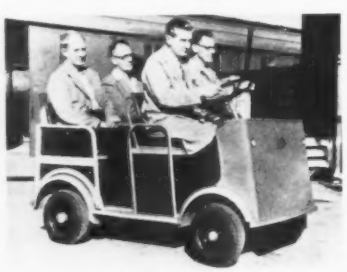
Each gives a comprehensive list of the applications of the relevant range of Rocol specialized industrial lubricants, subdivided into the main processes and equipment items.

Explosion-Proof Statotherm

The range of coarse temperature controllers manufactured by The Stabilag Co. Ltd, Mark Road, Hemel Hempstead, Herts, has been augmented by the addition of an explosion-proof model of the stratotherm energy regulator, suitable for use in hazardous and flame areas.

The unit is designed to take a maximum loading of 2kW and can be used on a 220-230 v supply; it regulates to infinity the electrical input between 10-100 per cent of the rated consumption. The mean heating output achieved with the regulator is obtained by intermittent operation corresponding to the time for which the controlled appliance is switched on and off.

Industrial Personnel Carrier



Wessex Industries (Poole) Ltd, Dolphin Works, West Street, Poole, Dorset, has introduced a four-seater electric industrial personnel carrier suitable for conveying staff or visitors speedily, safely, and economically to any part of industrial plant.

The 24v CAV electric traction motor produces speeds of up to approximateiy 15 mph when loaded, has a length of 6 ft 3 in, and a width of 3 ft 9 in overall.

Cathodic Protection Contracts

The Cathodic Protection Division of Metal and Pipeline Endurance Ltd (MAPEL) has gained the contract for protecting a number of East Midlands Gas Board mains from corrosion in parts of Lincolnshire, Derbyshire, Nottinghamshire, and Leicestershire.

Kelvin Hughes and Curtiss-Wright Agreement

An agreement, taking effect immediately, has been concluded between Kelvin & Hughes Ltd and the Curtiss-Wright Corp, of America, for the exclusive right to manufacture and sell the non-destructive testing equipment of materials and equipment employing ultrasonic techniques in all industrial fields. Each party to the agreement will offer full sales and service facilities on the joint range of equipment.

Kelvin Hughes will represent both interests in the U.K., the Commonwealth (except Canada), and Europe, and Curtiss-Wright in North America.

Three Ton Centre-Post Car Lift

The latest addition to the Wakefield Lubrequipment range of lubrication service equipment is an improved centre-post car lift which provides smooth and speedy elevation with complete safety, allowing all-round observation and freedom under any car. The lift is airdraulically operated and offers the minimum obstructions to both the working room and floor space. It has the further advantage that it may be used as a turntable enabling cars to be run off in any desired direction after servicing.

Sodium Dispersions

Acton Laboratories, 1180 Raymond Boulevard, Newark 2, New Jersey, announces the availability of sodium dispersions, which it offers as two standard products: sodium naphthalene dispersion, crushed solids 50 per cent sodium in mineral oil.

The nature of these products prohibits sampling, but orders for single pound lots are accepted.

Boating and Outboard Motors

Following on the entry into the field of outboard motor production—and marketing throughout the world—on the part of F. Perkins Ltd, Peterborough, the Company has released the first issue of its new publication *Outboard News*. With a newspaper-type format it tells of the Company's plans for its outboard motors, and of its sales and publicity services, and presents some idea of the many types of craft for which the motors can be used.

High Temperature Furnaces

A new leaflet on their "Standard High Temperature Furnaces" has been issued by Metalectric Furnaces Ltd, Cornwall Road, Smethwick 40, Staffs. The range has been developed for heat treatment processes which require higher temperatures than may be attained by nickel-chromium heating elements.

Industrial Diesels at London Show

The new 60 hp Perkins 203(I) Industrial diesel engine will be on view for the first time in Britain at the Mechanical Handling Exhibition at Earls Court, London. Suitable for many different types of industrial applications, this 4-cylinder addition to the wide Perkins range has a 3·6 in bore, a 5 in stroke, and 203·5 cu in capacity.

The engine is available with an hydraulic governor for variable speed applications, such as mobile cranes and fork-lift trucks, and is rated up to 60 bhp at 2400 rev/min. When fitted with a mechanical governor for continuous use, the Four 203 develops up to 47 bhp at 2000 rev/min. Features include adequate provision for power take-offs, chromium-plated steel thin wall liners, and the Perkins combustion system.

Weir Sea Water Distillation Plant

New publications received from G. & J. Weir Ltd, Cathcart, Glasgow, S.4, give information on the Weir "Multiflash" sea water distillation plant. Of the two pamphlets in question one covers the basic structure and operation of the plant, and the other provides a more comprehensive description and gives an idea of the extent of its use over the last fifty years.

Belgian Phthalic Project Awarded

A contract for the design, engineering, and construction of a 5000 metric ton/year phthalic anhydride plant has been awarded to Badger NV, The Hague, by Union Chimique Belge SA, Brussels.

The new phthalic plant will be constructed at Schoonarde at an estimated cost of over £700,000. This is the second European phthalic anhydride project awarded to Badger during 1959. The first, a 10,000 metric ton/year plant, is under construction for Aziende Colori Nazionali Affini, at Cengio, Italy. Badger is also currently completing a £1¾ million, 30 million lb/year plant for Reichhold Chemicals Inc, at Elizabeth, New Jersey.

Ethylene Plant at New Italian Industrial Complex

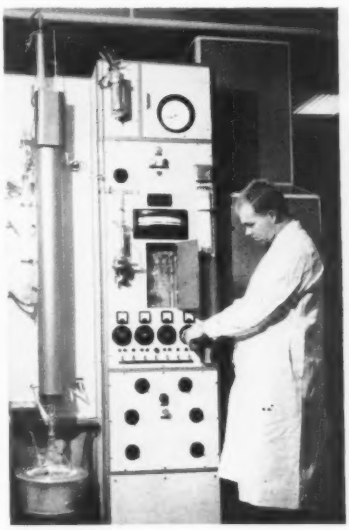
Design and assistance in procurement and construction of an ethylene plant designed for SINCAT SpA, in Sicily are being carried out by Stone & Webster Engineering Ltd of London.

The plant will be part of an integrated chemical manufacturing complex being developed at Priolo, a town north of Syracuse, by SINCAT, which is owned by the Societa Edison group, one of the largest power concerns in Italy.

Among features developed by Stone & Webster, to be included in the SINCAT ethylene plant, will be their patented ripple trays in some of the fractionating towers. These lightweight, stainless steel sieve trays are said to afford considerable savings in investment and in maintenance costs.

Atmospheric and Vacuum Distillation Simulator

Designed at the Research Centre of the British Petroleum Co. Ltd, Sunbury-on-Thames, and manufactured and marketed throughout the world by Winston Electronics Ltd, Shepperton, Middlesex, the BP free standing 14-plate atmospheric and vacuum distillation apparatus was developed originally for the distillation assay of crude oil, but has proved to be a very versatile unit for a wide range of laboratory distillation work in organic chemistry, and particularly in the petroleum and solvents field. It is shown in the accompanying photograph.



Light gaseous components can be handled in the liquid phase by circulation of suitable refrigerant in the condenser and receiver system, and provision is made for the metering of incondensible gases.

The dimensions of the standard column are 36 mm internal diameter, 1370 mm length, and 1220 mm packed length, the standard packing being stainless steel boot eyelets which gives a plate efficiency of 14. The column operates under adiabatic conditions.

The apparatus costs £1500–£2500 ex works, according to the accessories required.

Oil Mist Spray Equipment

Wakefield-Dick Industrial Oils Ltd has introduced an oil mist unit (Model M.3892) for the application of cutting oils. This unit, which operates at 10-20 psi, enables soluble or neat coolants to be fed to the work face in circumstances where surface speed normally makes dry machining necessary. It functions by delivering a fine mist of coolant in a stream of compressed air.

Extended Range of Stanhope-Seta Equipment

The recently completed expansion of the comprehensive range of petroleum testing equipment produced by Stanhope-Seta Ltd has necessitated the acquisition of additional premises. This has been met by the opening of new research and development laboratories at Park Close, Englefield Green, Surrey.

A new catalogue is now available which illustrates and describes the full range of the Company's standard products. New items presented in the catalogue include:

(1) the Seta micro vapour pressure apparatus, a recent development of the Reid method of vapour pressure determination, has been licensed for manufacture by Esso;
(2) Seta sliding plate microviscometer for testing of bitumen and other products, made under licence from Shell;
(3) fuel blending cabinet for preparation of reference fuels for engine testing—designed by BP;
(4) Static oil oxidation test—Shell-designed item;
(5) Seta composite multiple viscometer enabling Redwood 1, II and Saybolt Furol and Universal viscosity determinations to be conducted in one thermostatically-controlled bath;
(6) Seta-Lovibond colour comparator—meeting the new specification ASTM D1500.

The catalogue is divided into illustrated descriptions of apparatus; alphabetical and numerical indexes; an IP and ASTM methods table; and details of prices.

All standard items are periodically reviewed and enable the most efficient use to be made of the apparatus by busy control, routine, and research laboratories. Such apparatus as the Pensky-Martens flash point, oxidation stability, sulphur by the lamp and quartz tube methods, and automatic penetrometers have all incorporated recent improvements.

Situations Vacant

AUSTRALIA

THE UNIVERSITY OF NEW SOUTH WALES

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in

HIGHWAY ENGINEERING

—•—

The University invites applications for appointment to the positions of

SENIOR LECTURER/LECTURER

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Salary:

Senior Lecturer, £A2224 range £A2574 per annum.

Lecturer, £A1524 range £A2124 per annum.

Commencing salary according to qualifications and experience.

Applicants must possess a degree of high standing in engineering and should have had experience in general civil engineering. Previous research experience and corporate membership of the Institution of Engineers of Australia is desirable.

Knowledge of one or more of the following subjects will be an advantage:

> Soil mechanics, town planning, land drainage, quarrying, structural engineering and bridge design, reinforced concrete and prestressed concrete, road location and design, road construction and maintenance, bituminous construction and design of bituminous mixes, specifications, quantities and contract documents.

Successful applicants will lecture at post-graduate levels and participate in research programmes.

Appointees will be eligible for 12 months' study leave on full salary after 6 years of service.

Subject to passing a medical examination the appointees will be eligible to contribute to the State Superannuation Fund.

First-class ship fares to Sydney of appointees and families will be paid.

Four copies of applications should be lodged with the Agent General for New South Wales, 56–57 Strand, London, W.C.2, and a copy forwarded by airmail in an envelope marked "University Appointment" to the Bursar, The University of New South Wales, Box 1, Post Office, Kensington, New South Wales, Australia, by **19 April 1960.**

Geophysicist: Department of Scientific and Industrial Research. Pensionable post (graded as Geologist or Senior Geologist) in Geological Survey and Museum, London, for man at least 21 on 1.7.60. Duties are concerned with geophysical surveys in the field. Candidates should normally have (or obtain in 1960) 1st or 2nd Class honours degree in Geology, Geophysics, Physics, or Mathematics, together with a university qualification to at least first year standard in Geology and in Physics or Mathematics, or an equivalent qualification. Experience in Applied Geophysics an advantage. At least 3 years' post-graduate or other approved experience necessary for appointment as Senior Geologist. London salary within the scales £655–£1,150 or £1,233–£1,460, according to age, qualifications and experience. Starting pay may be above minima. Promotion prospects. Write Civil Service Commission, 17 North Audley Street, London, W.1, for application form, quoting S/5114/60. Closing date 13 April 1960.

Works' Chemist required for Manchester. Experienced in testing of products from petroleum distillation and control of staff. Minimum standard HNC. Apply Box No. 1131 *IP Review*.

* * *

FOR SALE

WATERFOG and Waterspray Installations, automatic or non-automatic, designed and installed for Fire Fighting. Also complete Foam Installations.—Fire Armour Limited, 9 George Street, London, W.1.

* * *

Forthcoming Meetings

THE INSTITUTE

(*At* 61 *New Cavendish Street, London, W.*1, 5.30 *p.m.—tea* 5 *p.m.*)

Systematic Prediction of Refinery Utilities. F. P. Alban. **6 April**

Europe's Energetic Forecasting. P. Chantler. **4 May**

IP ESSEX BRANCH

(*At Bull Hotel, Pitsea*, 7.30 *p.m.*)

Why International Measurement? H. Hyams. **20 April**

IP LONDON BRANCH

(*At* 61 *New Cavendish Street, London, W.*1, 6 *p.m.—tea* 5.30 *p.m.*)

The Problems of Air Pollution. Dr S. R. Craxford, B.A. **21 April**

IP NORTHERN BRANCH

(*At Chemical Engineering Bldg, Manchester College of Science and Technology, Jackson Street, Manchester*, 6.30 *p.m.*)

Sealing Against Pressure and Vacuum. **26 April**

IP STANLOW BRANCH

(*At Blossoms Hotel, Chester*, 7.30 *p.m.*)

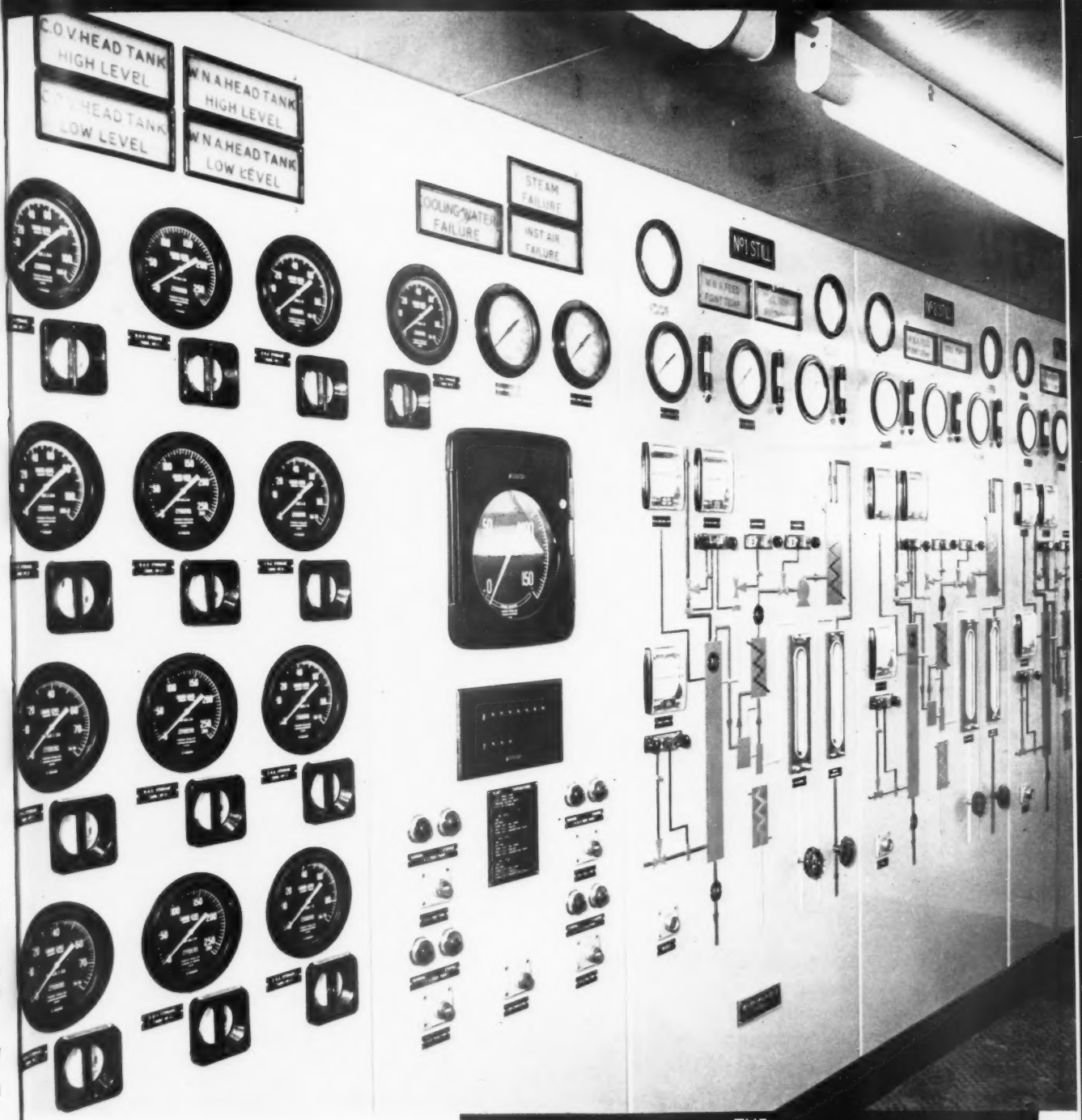
Use of Plastics in Plant Construction. M. A. H. Lanyon, B.A. **20 April**

IP ECONOMICS AND OPERATIONS GROUP

(*At* 61 *New Cavendish Street, London, W.*1, 5.30 *p.m.—tea* 5 *p.m.*)

A Review of the Year. D. F. Mitchell. **7 April**

INSTRUMENTATION and CONTROL



Matthew Hall & Co. Ltd. designed and installed this control panel with associated instrumentation for a chemical plant. It provides a centralized position for the automatic control and indication of temperature, flow, pressure and liquid level, together with a process alarm system.

THE
MATTHEW HALL
GROUP OF COMPANIES

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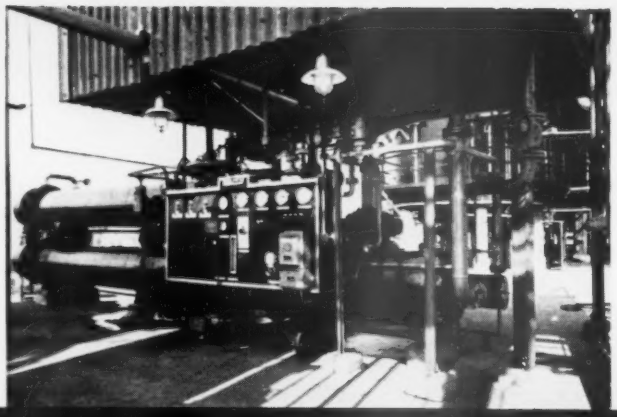
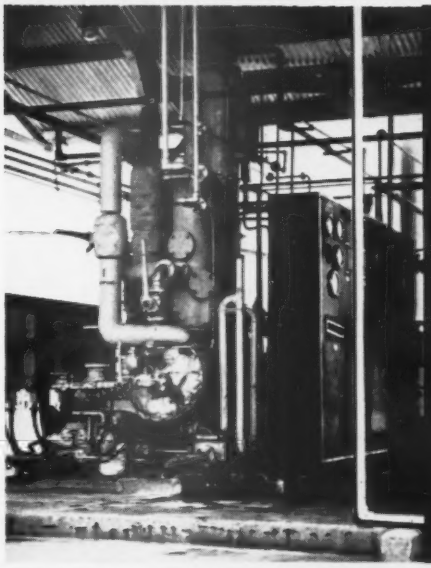


Whitegate Refinery

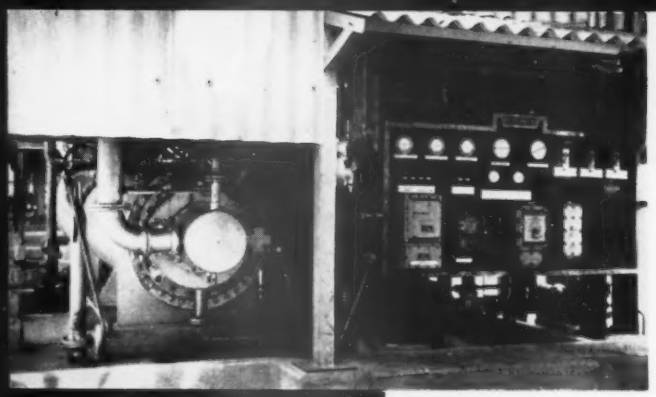
A 30,000 c.f.h. propane fired Inert Gas Generator installed at the Whitegate Refinery of the Irish Refining Company Limited. This generator supplies gas used on the catalyst reforming unit during the regeneration of catalyst.

Mina al Ahmadi Refinery

A 530 c.f.h. Holmes-Kemp Nitrogen Generator installed at the Mina al Ahmadi Refinery of the Kuwait Oil Company Limited. This generator produces a high purity nitrogen (99.8%) which is used for general purging purposes on the Platformer unit.



controlled atmosphere generators



Fawley Refinery

A 60,000 c.f.h. refinery gas fired Inert Gas Generator installed at the Fawley Refinery of the Esso Petroleum Company Limited. This is a variable output generator and is fitted with a gas analyser controller to ensure production of a high purity gas.

W. C. **HOLMES** & CO. LTD.

Gas Handling Division, Turnbridge, Huddersfield

Telephone: Huddersfield 5280
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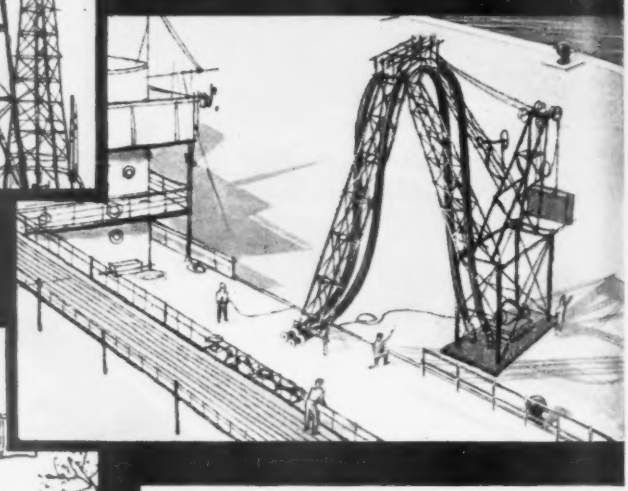
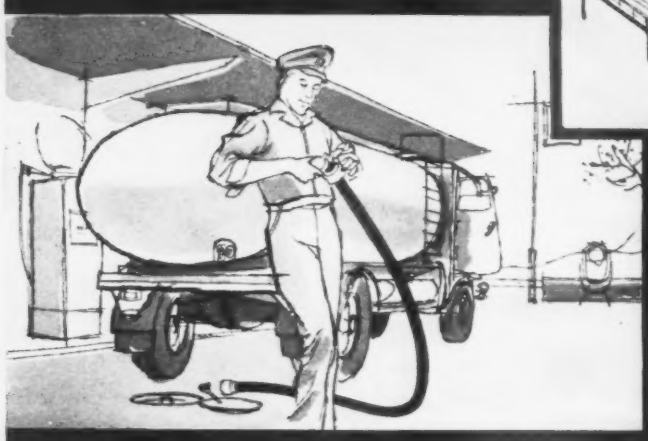
B55

From PRODUCTION





to MARKETING

U.S. Rubber is the world's largest manufacturer of the widest range of rubber products serving the oil industry. U.S. Rubber Rotary Hose, Dock and Sea Loading Hose, Aircraft Fuelling, Road and Rail Tanker, Kerbside Pump Hose—all play a vital part in seeing the job through efficiently. Service always comes first—and sales follow. High quality hose and sound technical advice are the guiding principles of our Development and Quality Control Division. U.S. Rubber maintains a network of representatives at key geographical positions in the oil world to provide service and advice to customers on a range of the finest hoses available on the market today. Full descriptive literature of the whole U.S. Rubber Hose range sent on request.

U. S. Rubber

Home: *The North British Rubber Company Limited*
Export: *U.S. Rubber International (Great Britain) Ltd.*

ABBey 5611

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Mobil geologists ford ice-cold stream

On the trail of oil

Mobil explores the world to find the world's oil

Behind your filling-station attendant in the Mobil uniform there are many experts in a diversity of fields.

The geologist who looks for oil, the driller who brings it to the surface, and the tanker skipper who delivers the crude oil to Mobil's British refinery at Coryton; the chemist who has contributed so much to the power and the remarkable economy of Mobilgas, and the lubrication engineer who has helped to make Mobiloil Special the finest motor oil in the world—these are representative of the 78,000 employees of Mobil, a world-wide organisation serving the motorist —and, of course, road transport, heavy industry, the railways, power-stations, ships, and every kind of industrial undertaking.

It is oil that keeps the modern world turning, and there is no room for compromise in the demands that are made on the oil industry. Mobil stands for an organisation that, for nearly a century, has had an honoured name in this industry.

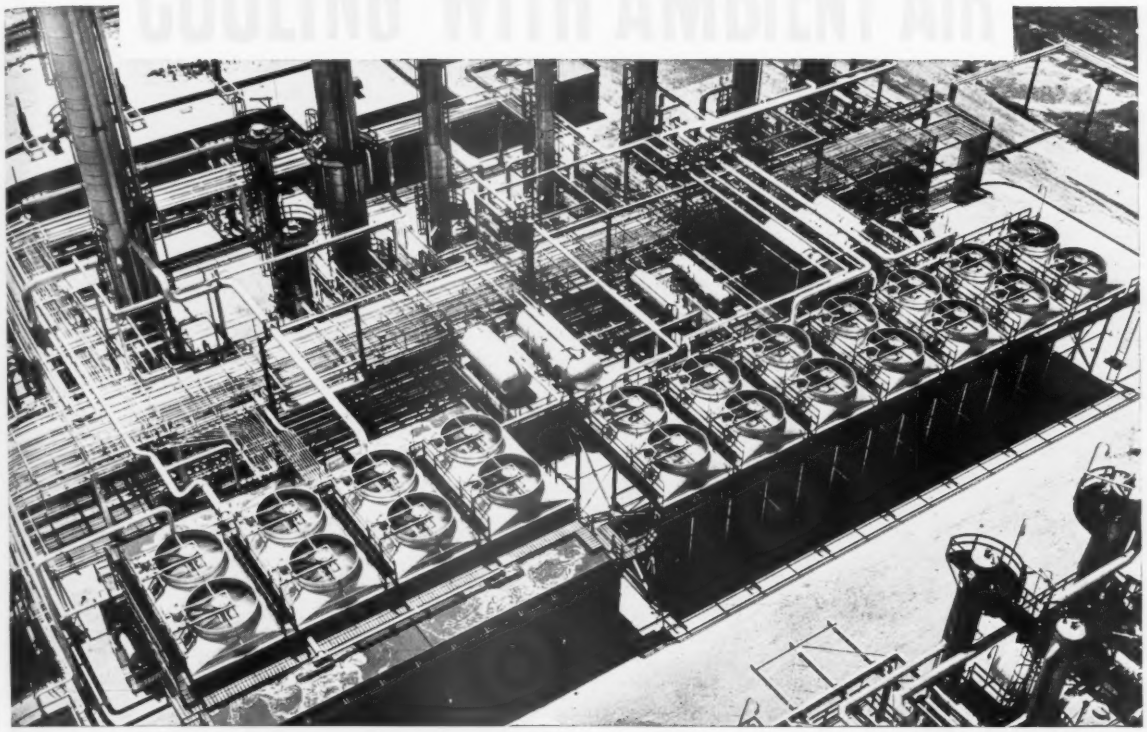
Mobil

SUNBURY-ON-THAMES, ENGLAND

Locust hordes reported! Place – the BP Research Centre at Sunbury-on-Thames. Here scientists are busy breeding and killing the insects to test new solvent oils which will provide even more effective bases for insecticides.

BP

COOLING WITH AMBIENT AIR



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iver pollution avoided.
dditional surface unnecessary for coolant fouling.
nduced or forced draught fans have tough lightweight blades.
uaranteed performance of equipment.

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U ndesirable contamination of product impossible.
D escaling of cooling surface avoided.
S hut down on power failure unnecessary.
O ffers only solution where water is scarce.
N o extravagant operating costs.

ontrol of product temperature by Auto Variable pitch fan, if desired.
ptimum ratio of fin to bare tube surfaces.
perates with safety—no large pressure parts to give trouble.
ong operational runs.
experience dictates use of extruded aluminium fins.
educed maintenance over conventional heat exchangers.
ervice life is greater.

Licensees of Hudson Engineering Corporation, Houston, Texas

A. F. CRAIG & CO. LTD.

Caledonia Engineering Works, Paisley, Scotland. Telephone: PAISLEY 2191

London Office

727 Salisbury House, London Wall, E.C.2. Telephone: NATional 3964

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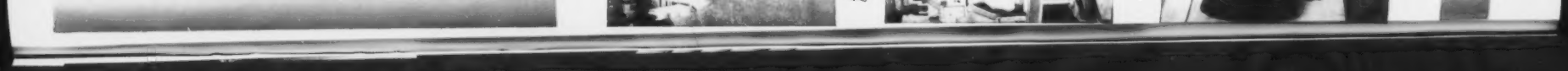

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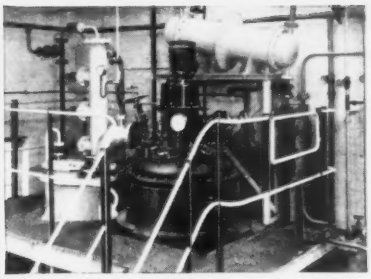
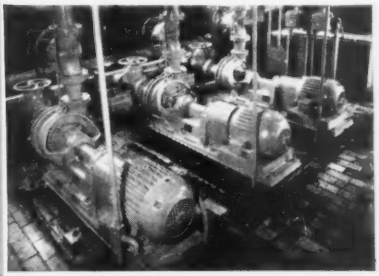
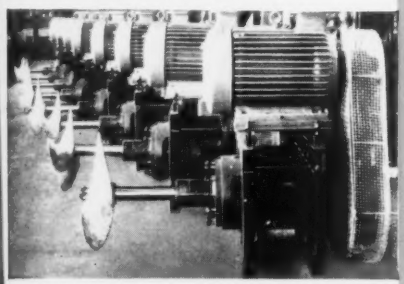


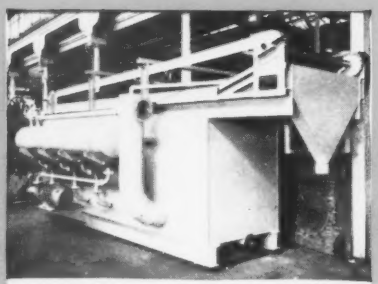
Resin making plant with electric induction heating.



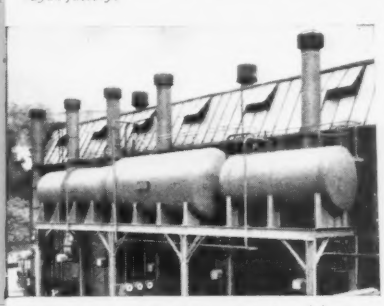
Battery of Mitchell centrifugal acid pumps in a rayon factory.



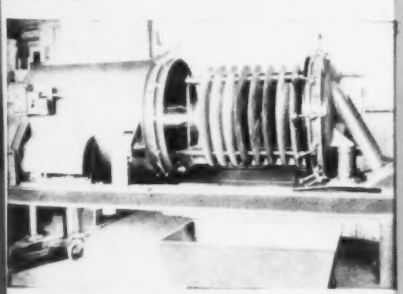
Battery of large side-entry mixers for petroleum blending.



Gibbs air flotation cell plant for the removal or recovery of greasy residues.



Bulk storage and distribution plant for sulphuric, hydrochloric and nitric acids in the Steel industry.



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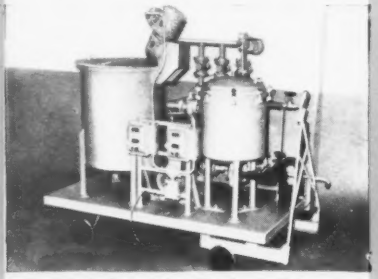

Sparkler horizontal plate filter for clarifying resins.

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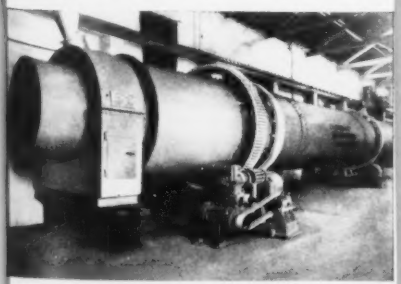

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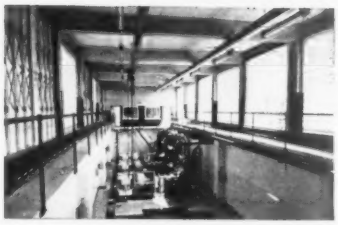

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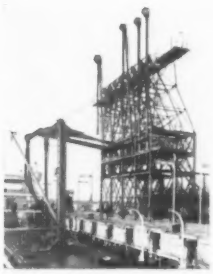

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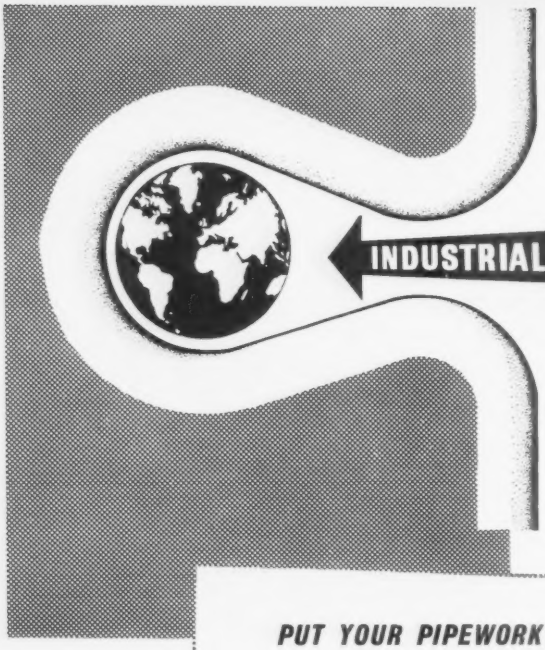

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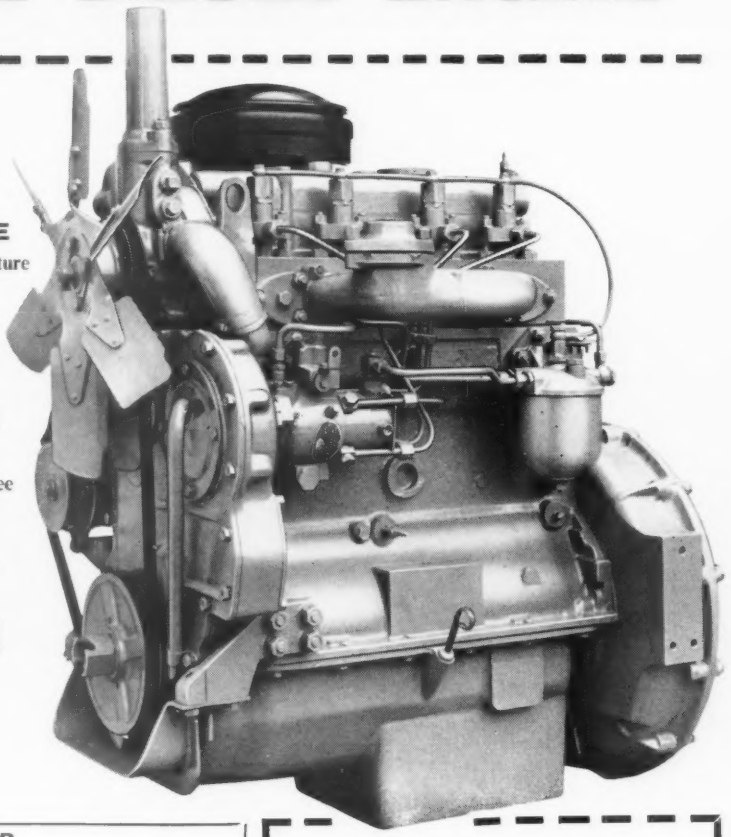

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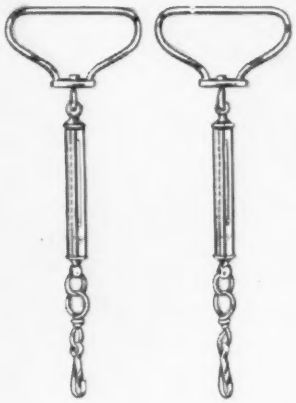

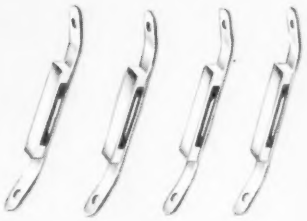

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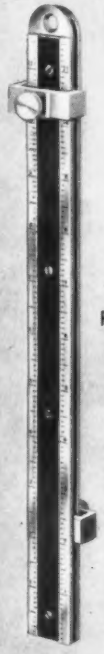

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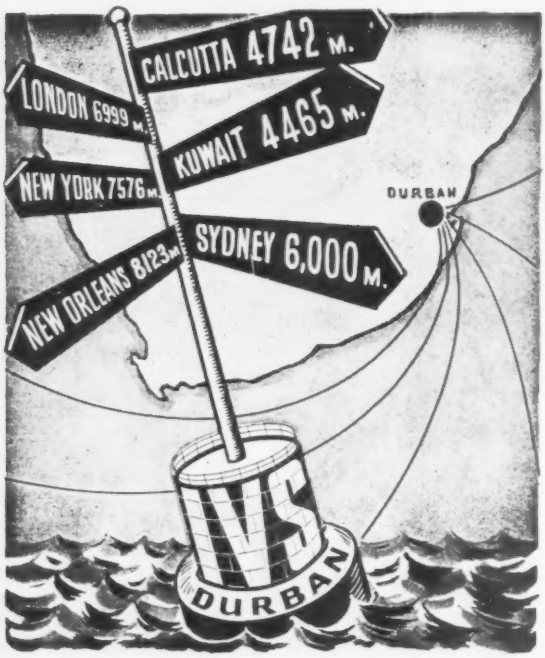

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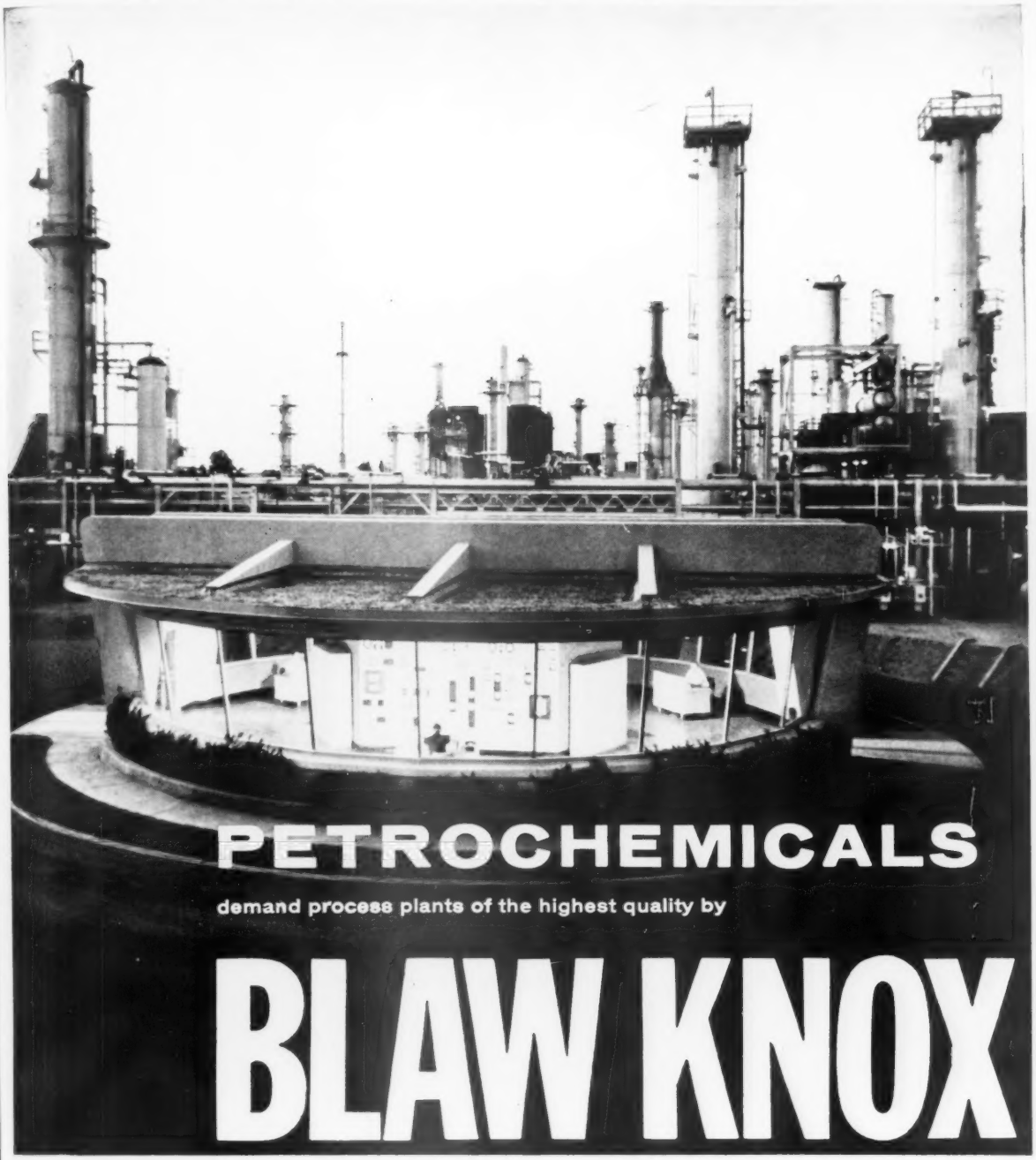

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Cameron Iron Works Inc ... ... (*Boone and Cummings*)	vii
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Dresser Industries (G.B.) Ltd ... ... (*Persons Advertising Inc*)	xi
Drums Ltd ... ... (*Mayfair Advertising Ltd*)	xviii
Esso Petroleum Co. Ltd ... ... (*McCann-Erickson Advertising Ltd*)	xvii
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London & Thames Haven Oil Wharves Ltd ...	xxix
M. & C. Switchgear Ltd ... ... (*Rex Publicity Ltd*)	xiv
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Metal Propellers Ltd ... ... (*Hall Publicity Ltd*)	xiii
Mission Manufacturing Co. Ltd ... ... (*Walter Skinner Ltd*)	xv
L. A. Mitchell Ltd ... ... (*Wilson Advertising Ltd*)	xxvii
Mobil Oil Co. Ltd ... ... (*Masius & Ferguson Ltd*)	xxiii
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Petrofina (Gt. Britain) Ltd ... ... (*Downtons Ltd*)	viii
P. G. Engineering Ltd ... ... (*Adams Bros. & Shardlow Ltd*)	iii
Plenty & Son Ltd ... ... (*Adams Bros. & Shardlow Ltd*)	Mar.
Premaberg (Great Britain) Ltd	i
W. Press & Sons Ltd ... ... (*Kingham Advertising Agency*)	xii
John Rabone & Sons Ltd	xxxii
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Shell-Mex & B.P. Ltd ... ... (*Colmans, Prentis & Varley Ltd*)	xx
Peter Spence & Sons Ltd .. .. (*Holmwood Advertising Ltd*)	Feb.
Stanhope-Seta Ltd	xvi
Stewarts and Lloyds Ltd ... ... (*H. Raymond Morgan*)	Feb.
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Tilghman's Ltd	vi
H. Tinsley & Co. Ltd ... ... (*James Sutherland Publicity Ltd*)	Feb.
Union Carbide Ltd ... ... (*Industrial Publicity Service Ltd*)	xxxiv
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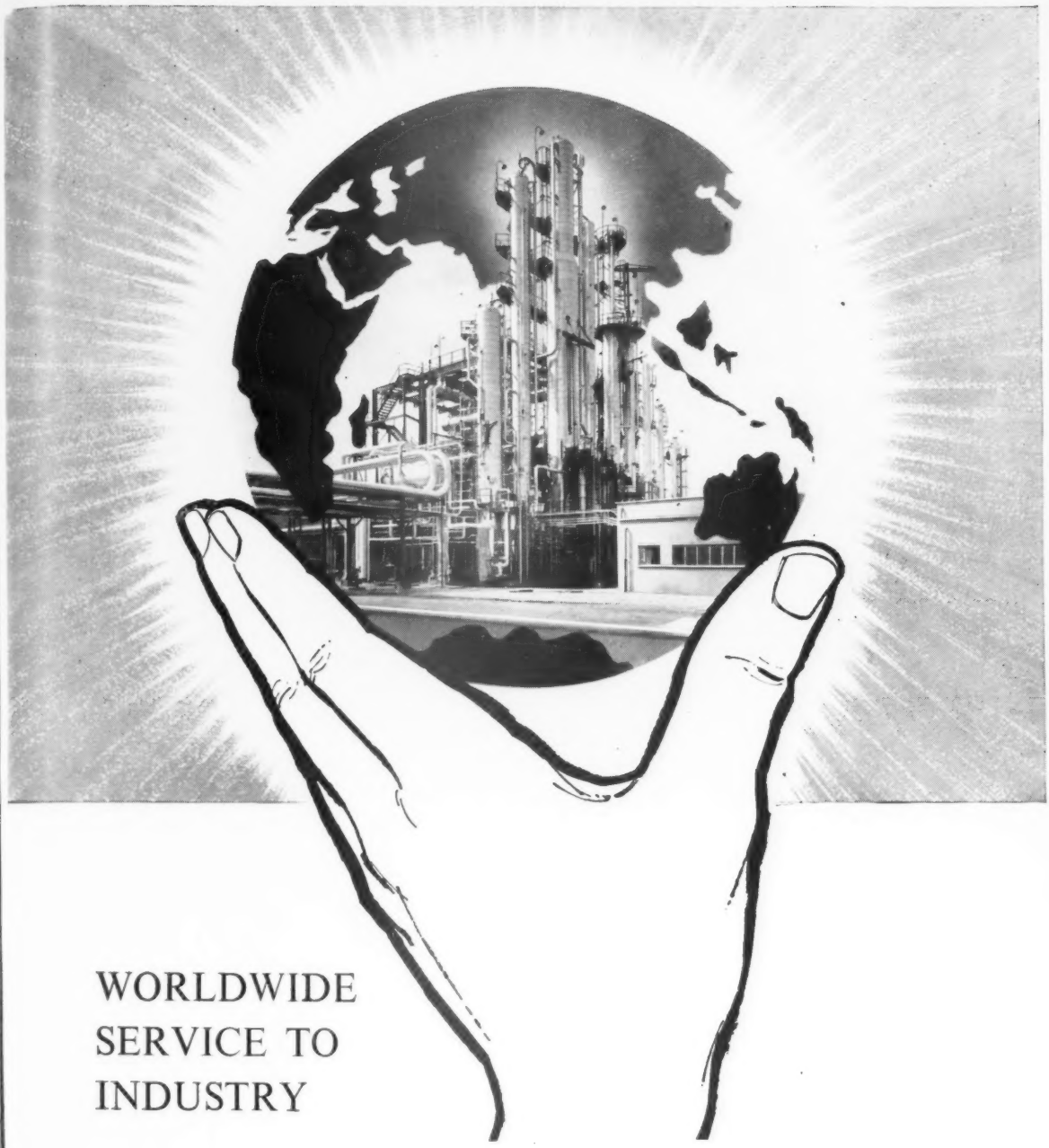

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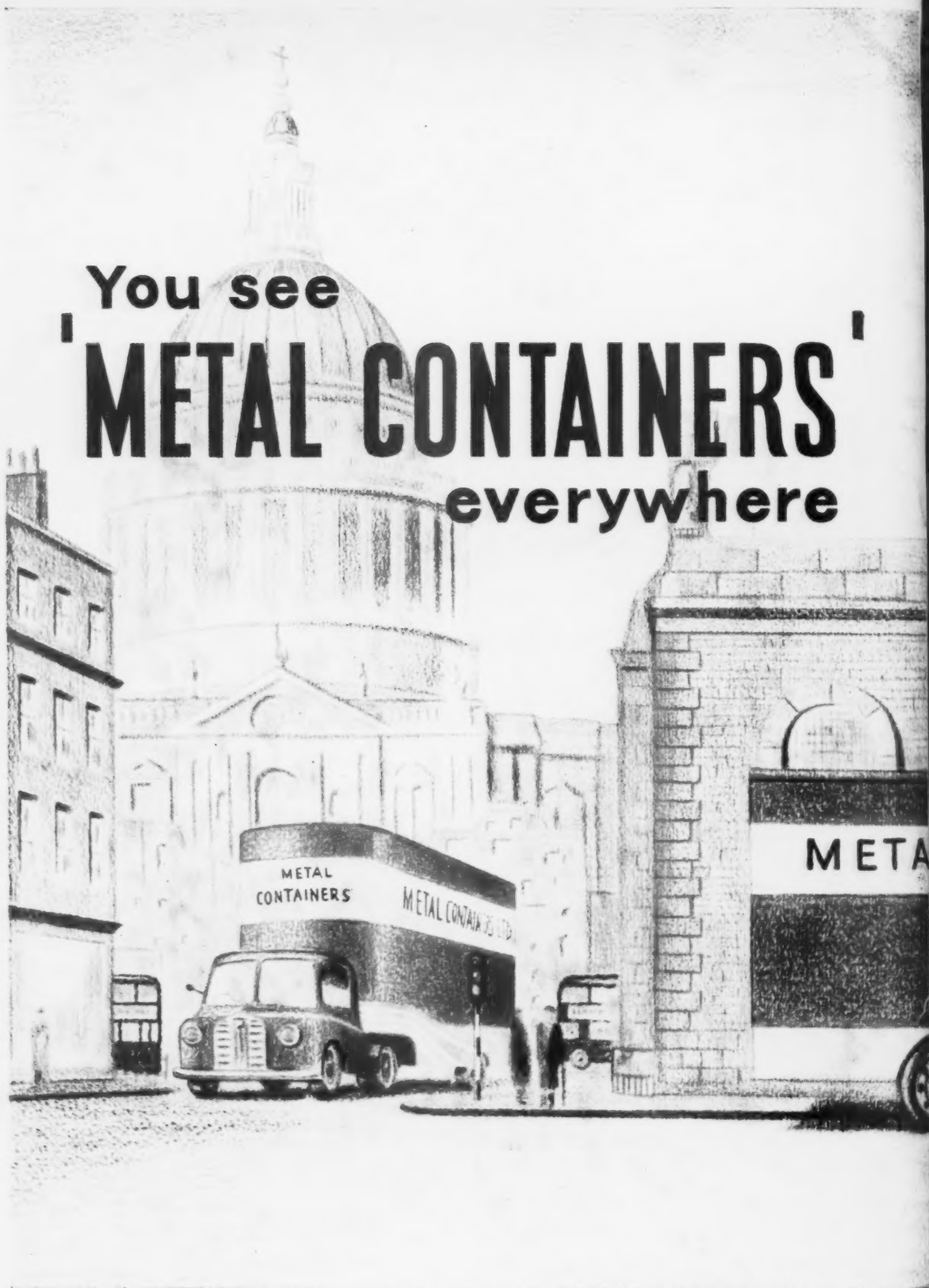

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